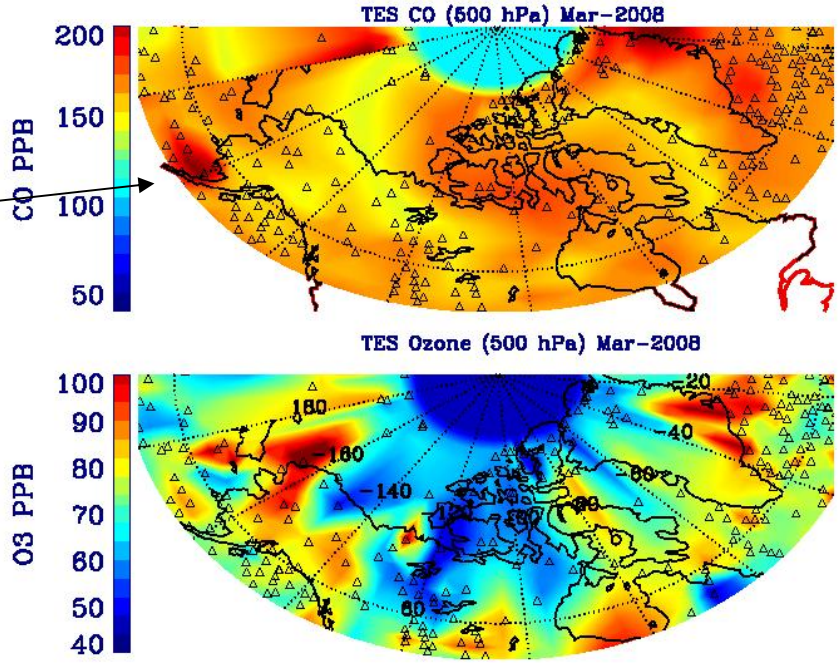
TES Observations of Ozone and CO prior to ARCTAS (March 25th)

March tropospheric Average

CO shows background levels consistent with MOPITT

High CO off of Alaska?

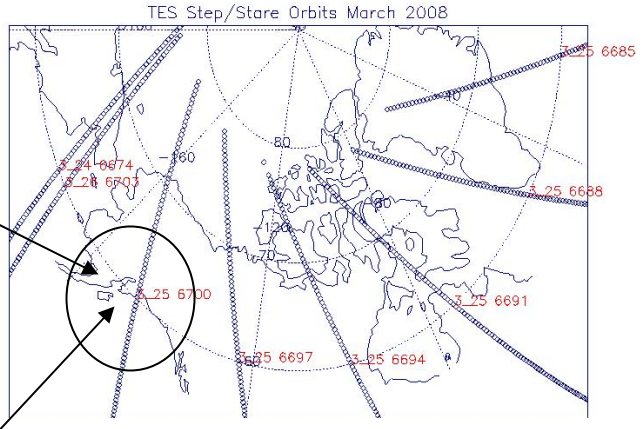


Ozone shows significant variability but no obvious correlations with CO.

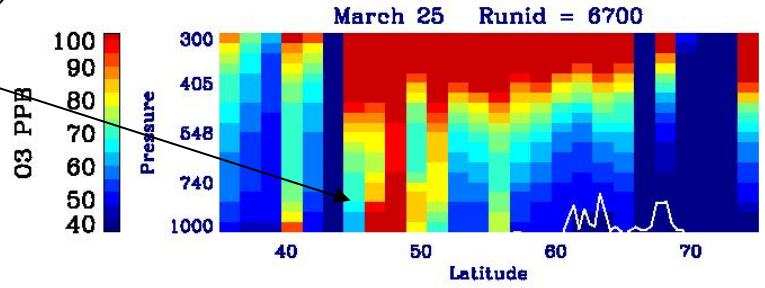
These observations all have fairly weak signal so need to be careful about interpreting spatial variations

TES step-and-stare Observations

Run 6700 chosen for initial analysis

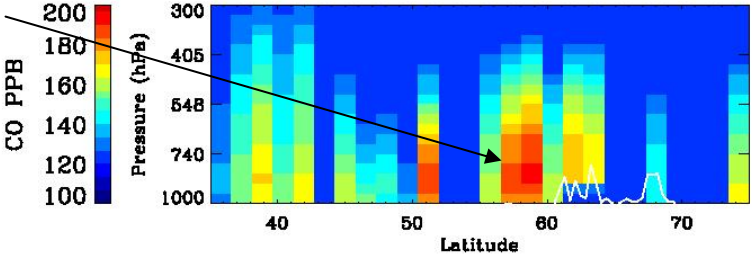


Six observations at 49 degrees latitude show high ozone… stratospheric influence?



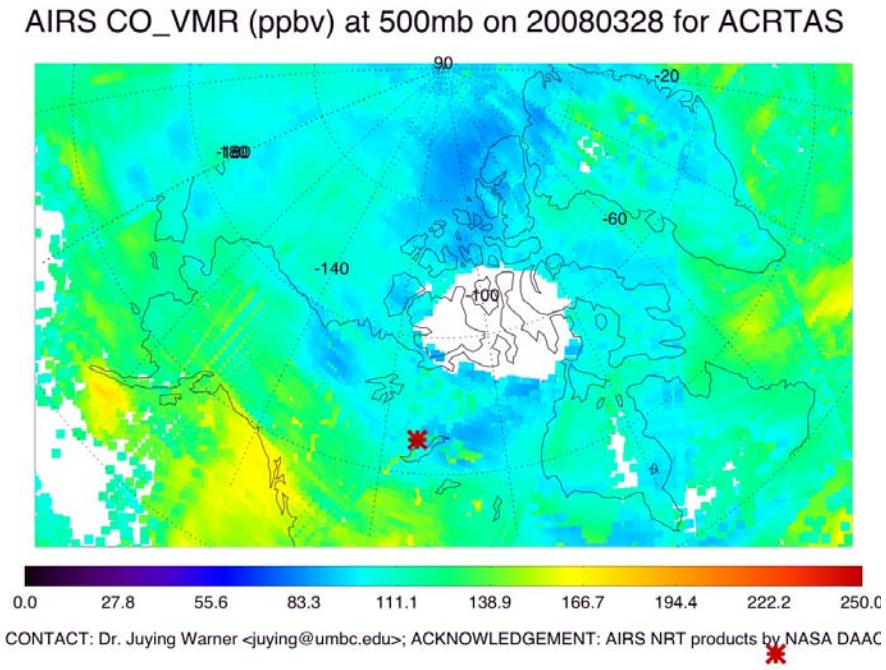
Possibly enhanced CO near Alaska.

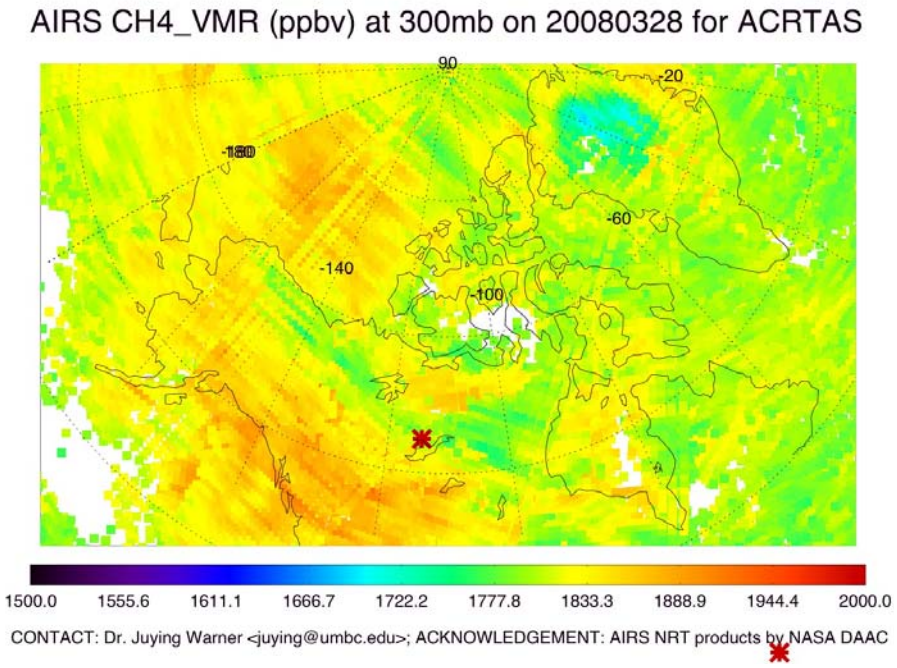
However CO background levels can be near these levels in March



AIRS NRT ARCTAS Support: latest CO & CH_4

Juying Warner and Zigang Wei

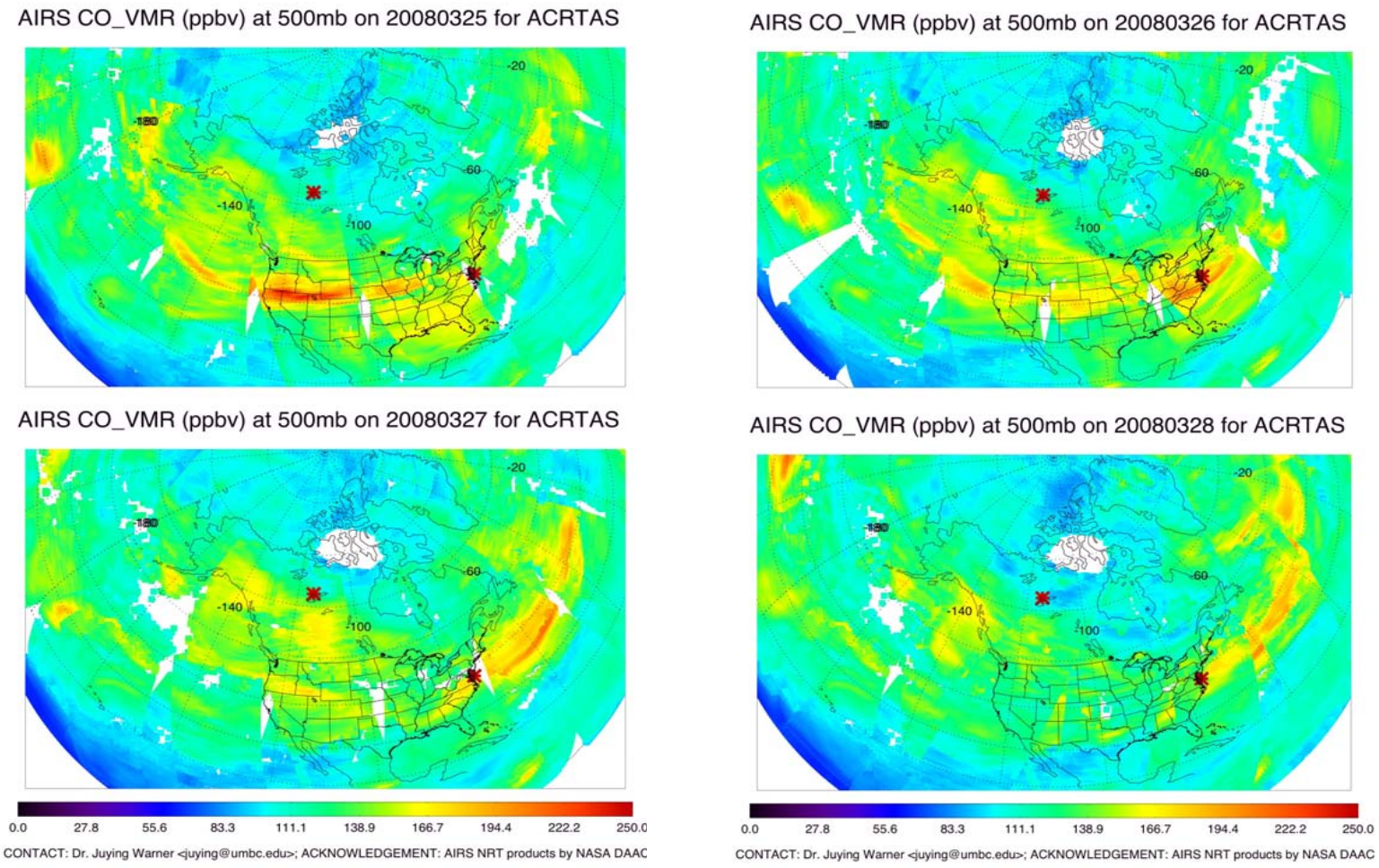




- AIRS CO at 500mb (ppbv) show stable patterns over the Arctic region for the last few days
- Higher CH_4 concentrations north of and over Alaska.
- Red stars mark Yellowknife and Wallops, respectively.

AIRS NRT ARCTAS Support: CO Transports

March 25-28, 2008

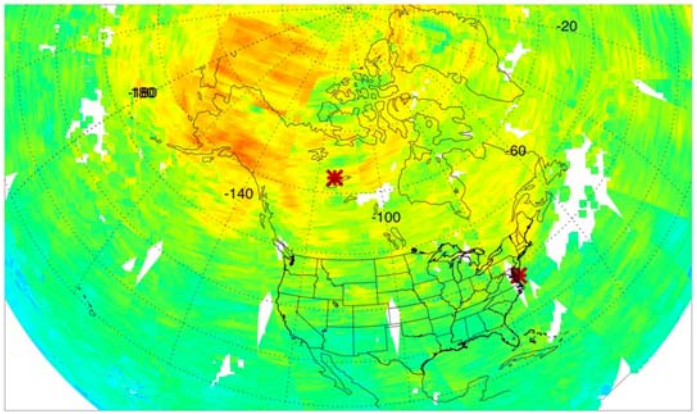


- Large plumes already passed P-3 flight track.

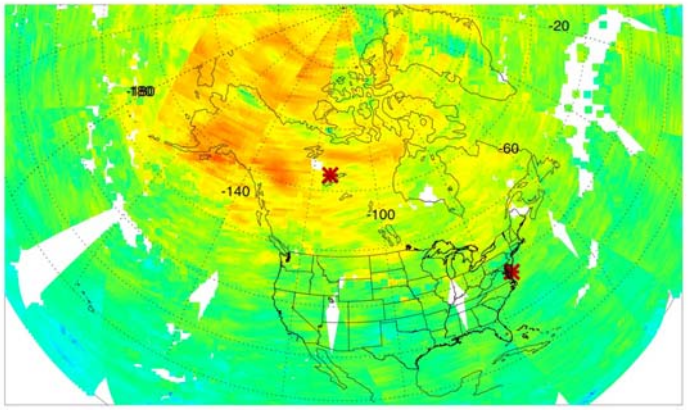
AIRS NRT ARCTAS Support: CH_4 Changes

March 25-28, 2008

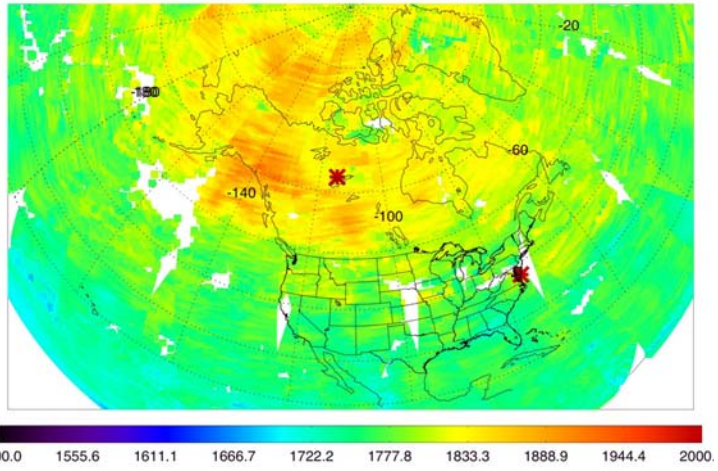
AIRS CH4_VMR (ppbv) at 300mb on 20080325 for ACRTAS



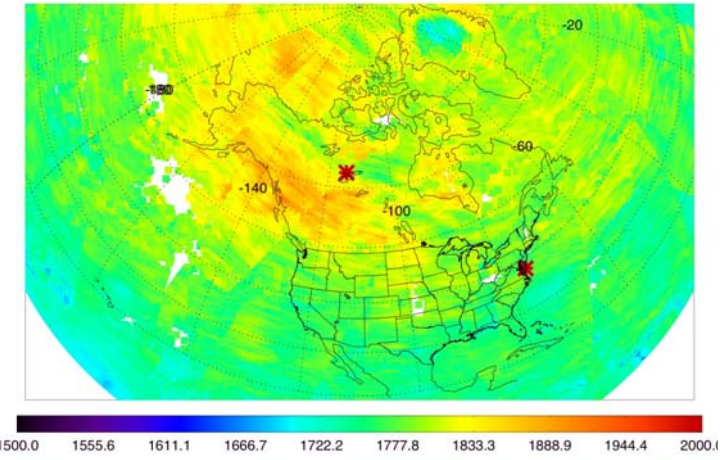
AIRS CH4_VMR (ppbv) at 300mb on 20080326 for ACRTAS



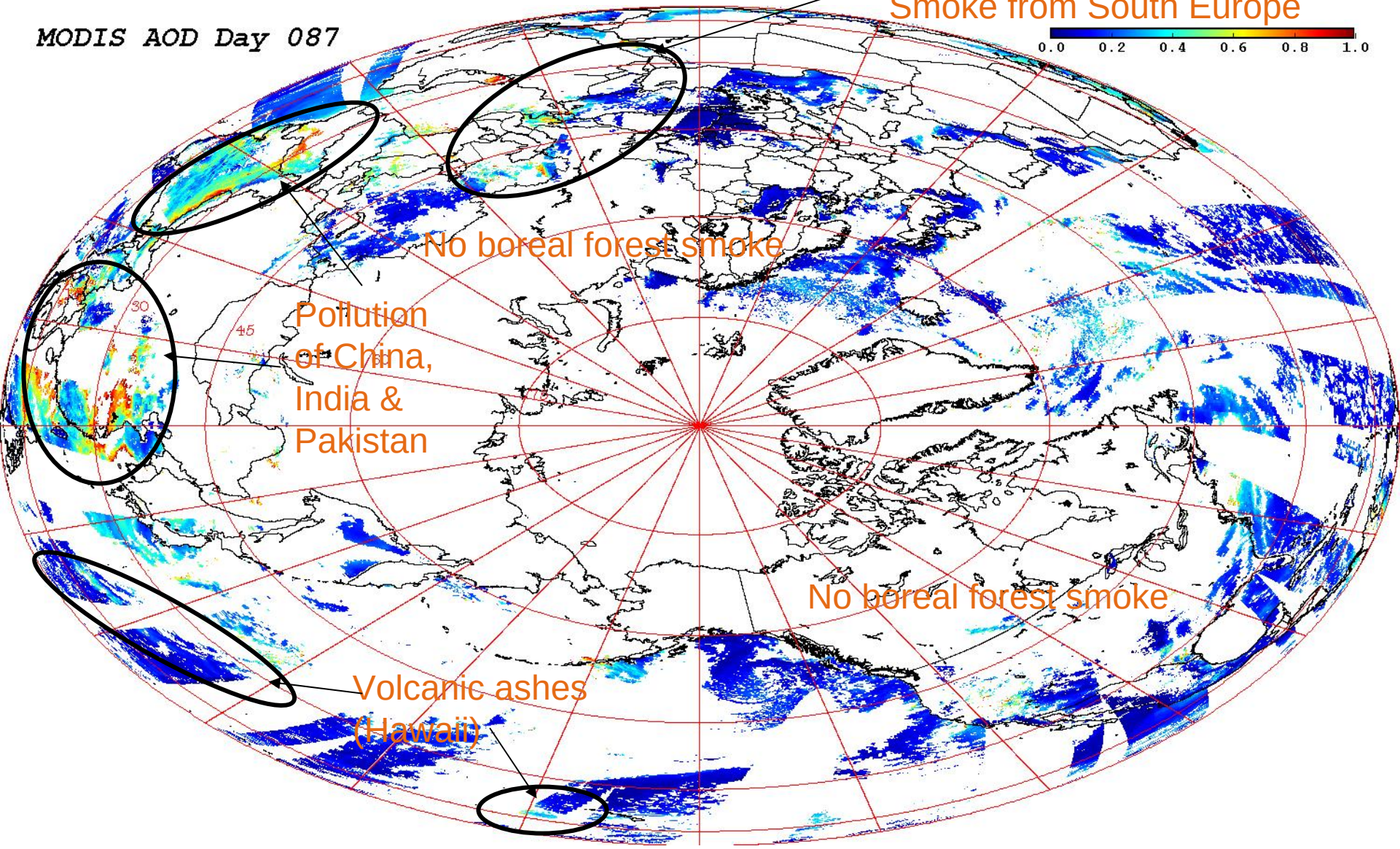
AIRS CH4_VMR (ppbv) at 300mb on 20080327 for ACRTAS



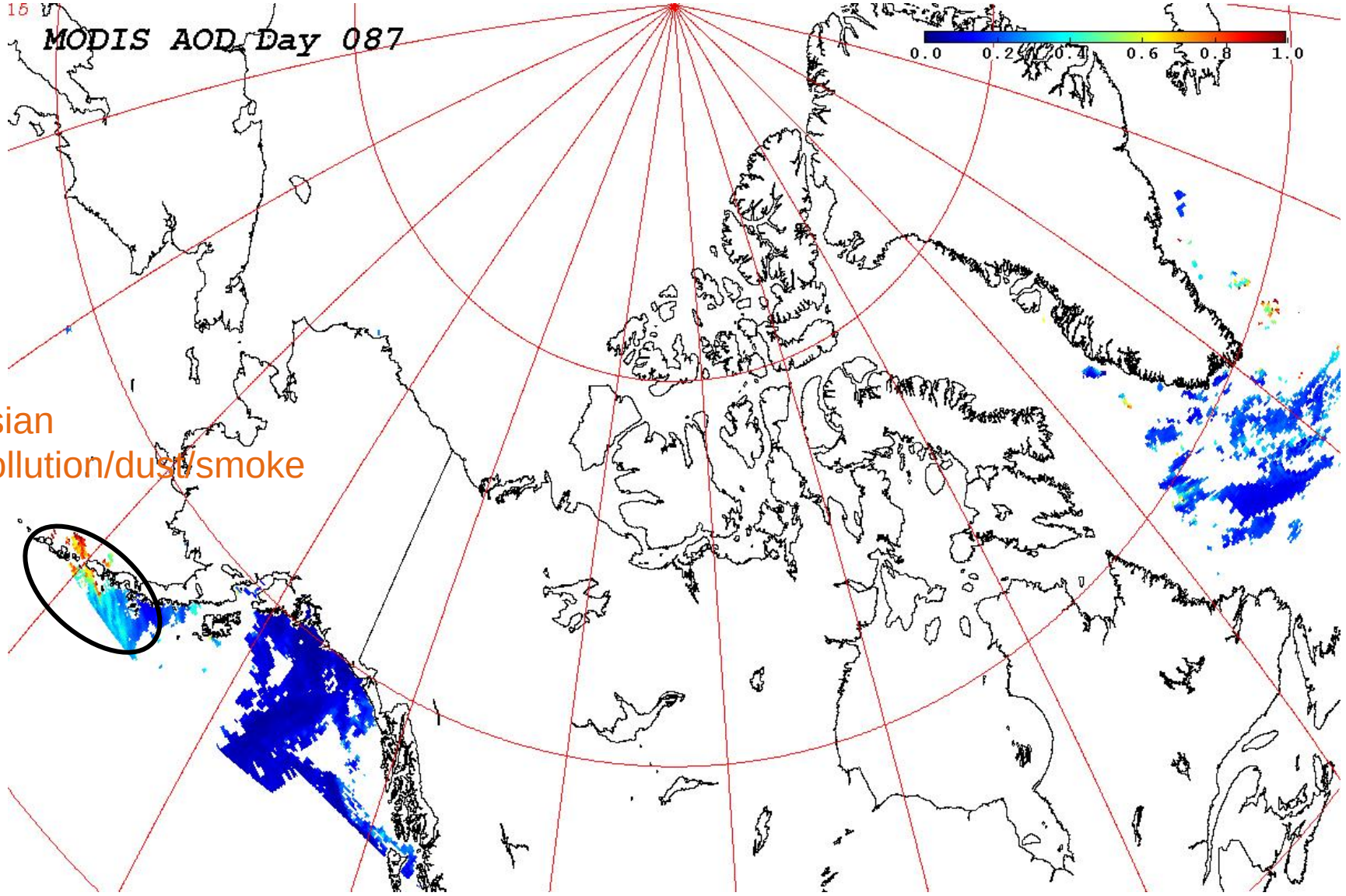
AIRS CH4_VMR (ppbv) at 300mb on 20080328 for ACRTAS



MODIS AOD Hot Spots in North Hemisphere (0° - 90°N)



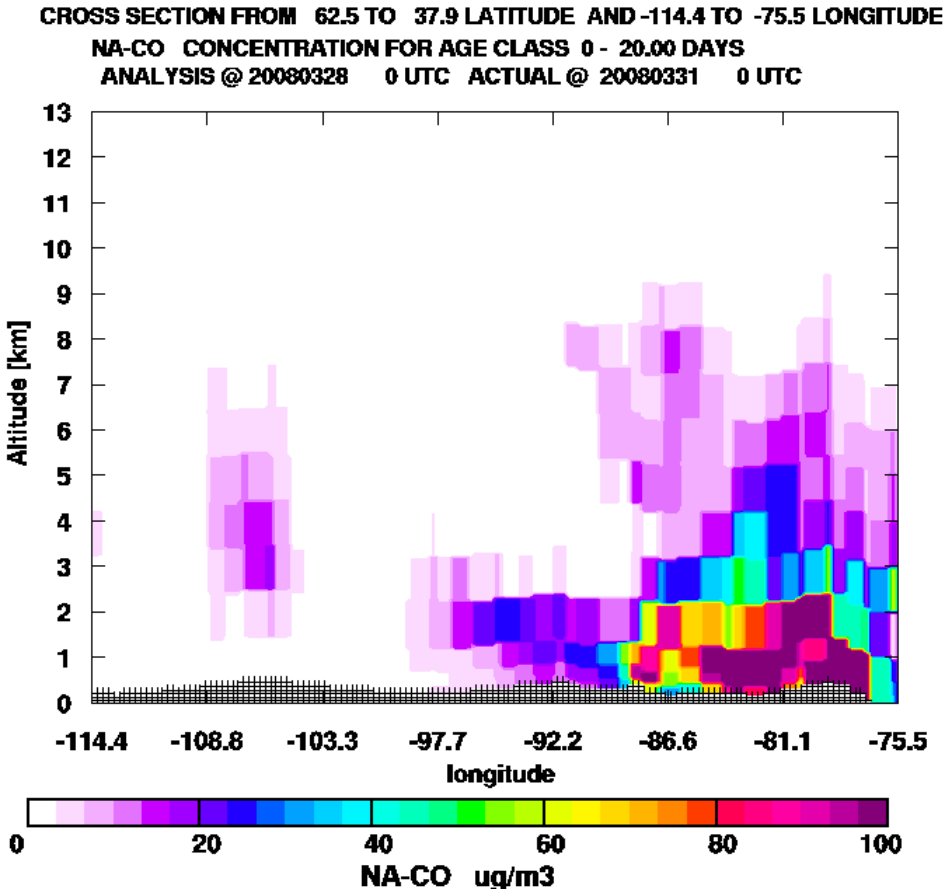
MODIS AOD Hot Spots in Flight Domain

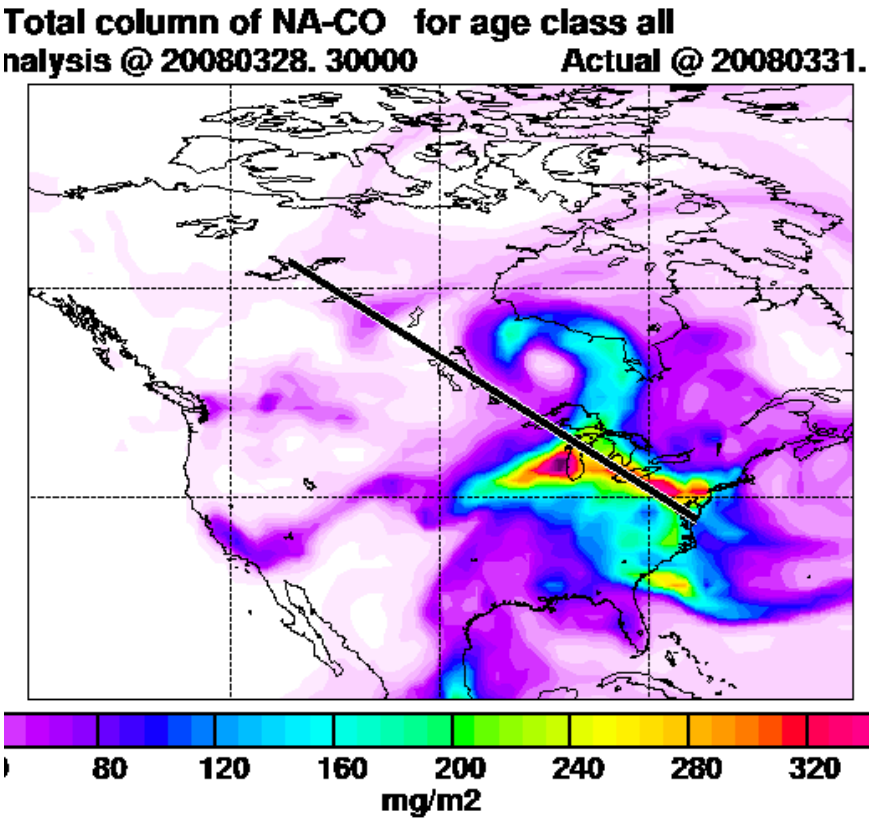


* April 1st ferry flight will most likely encounter Asian pollution/dust/smoke

FLEXPART FC, 03 UTC 28 Mar, N. American plume

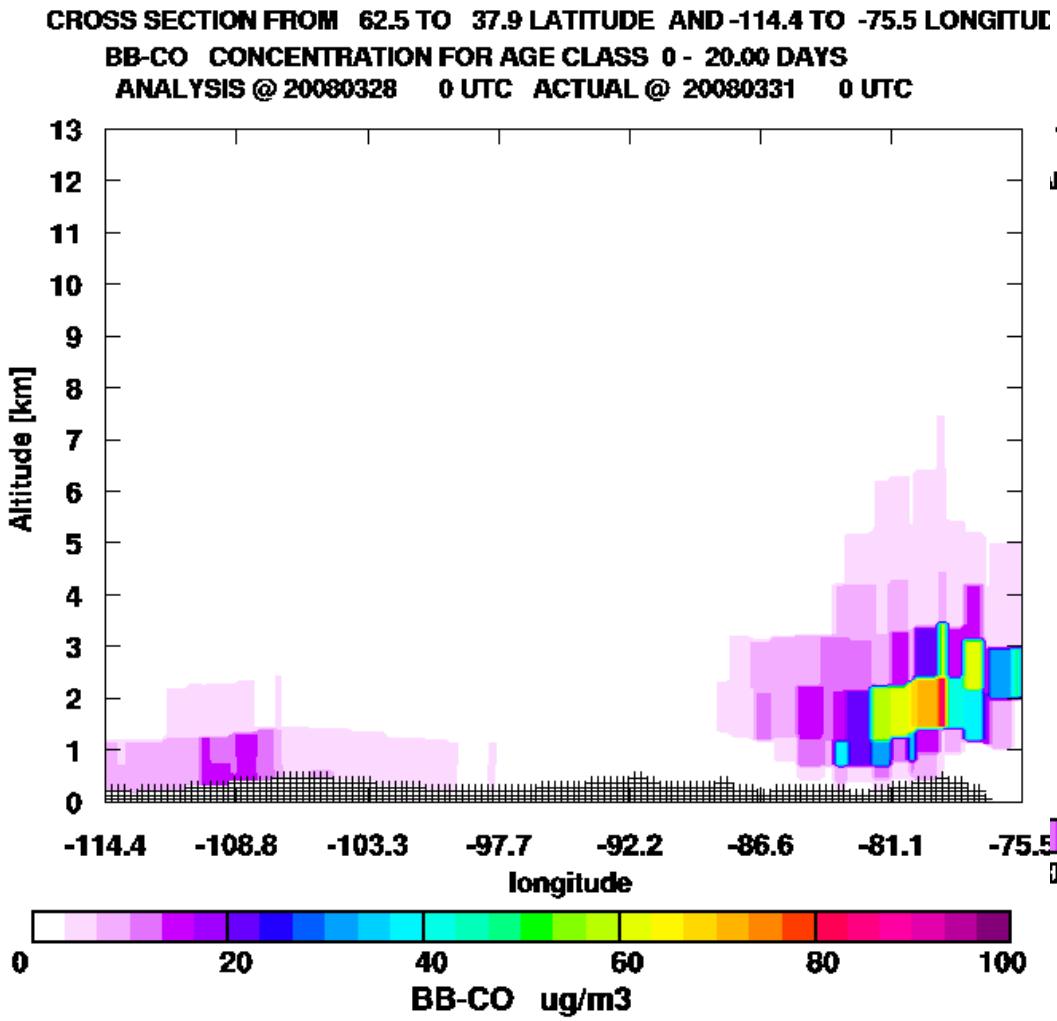
Tracers CO, NO2, SO4, BC for North America (NA), Asia (AS), EU, and biomass burning (BB) examined for 00-21 UTC 31 Mar. Shown is CO tracer.

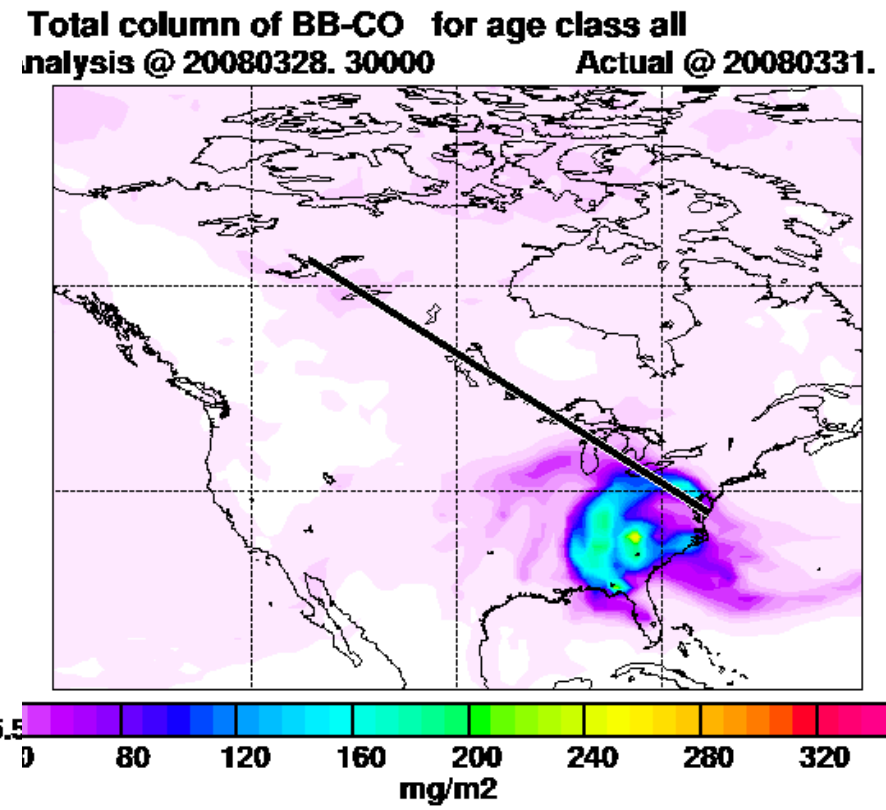




Pronounced plume south of 45N, moving anticyclonically in ENE directions, maximum over Lake Michigan. Altitudes mostly below 2km, maximum altitudes 8 km near 43N, 85W,subsiding tendency (max altitudes 3 km at 21 UTC 31 Mar)

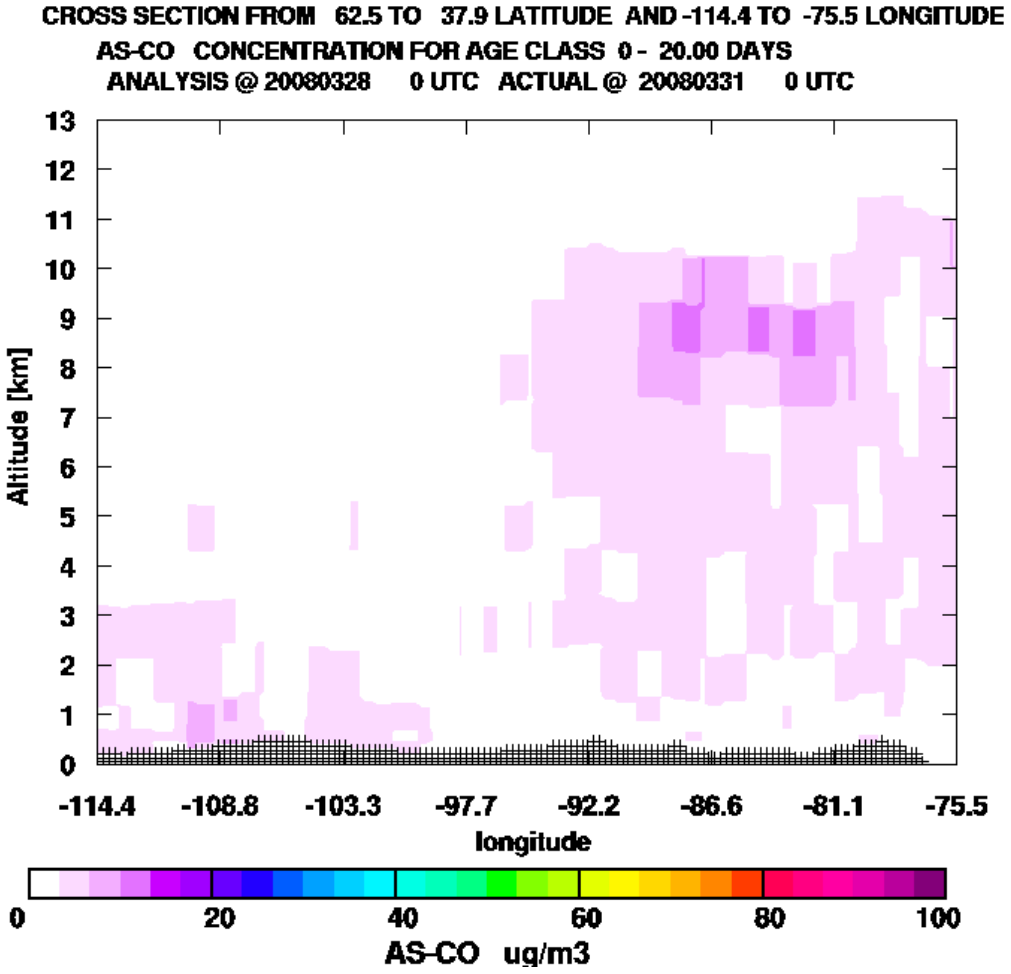
FLEXPART FC, 03 UTC 28 Mar, biomass burning

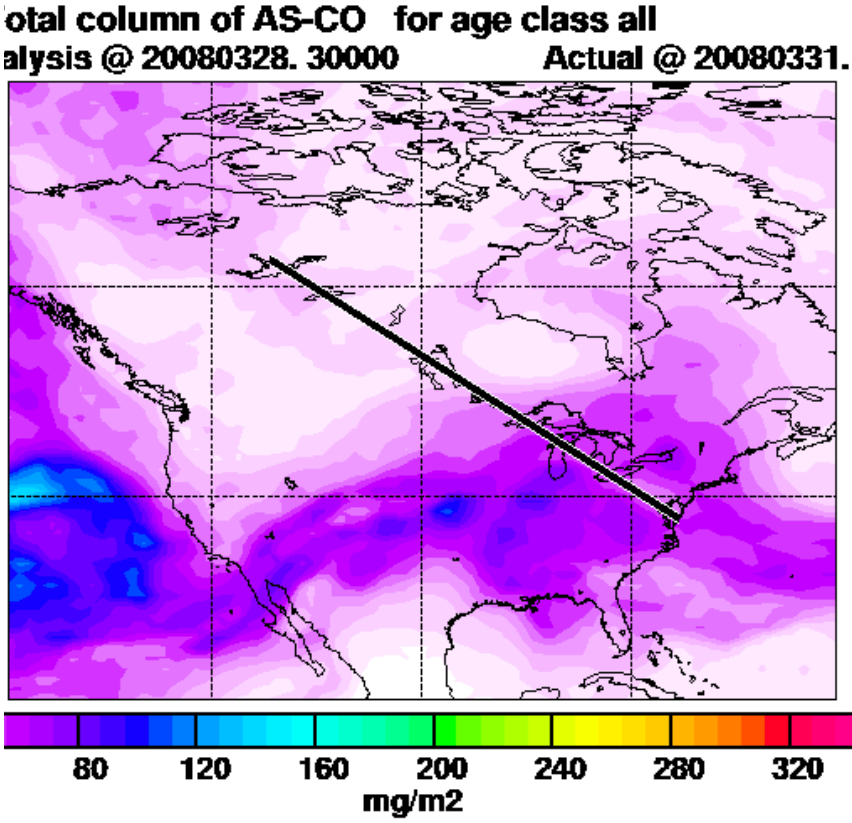




Low-level plume, anticyclonic motion, maximum band SW-NE oriented, crossed at 42N, 82W, vertical extend 3 km - surface. Second plume north of 50N, boundary layer (below 1km). No BC

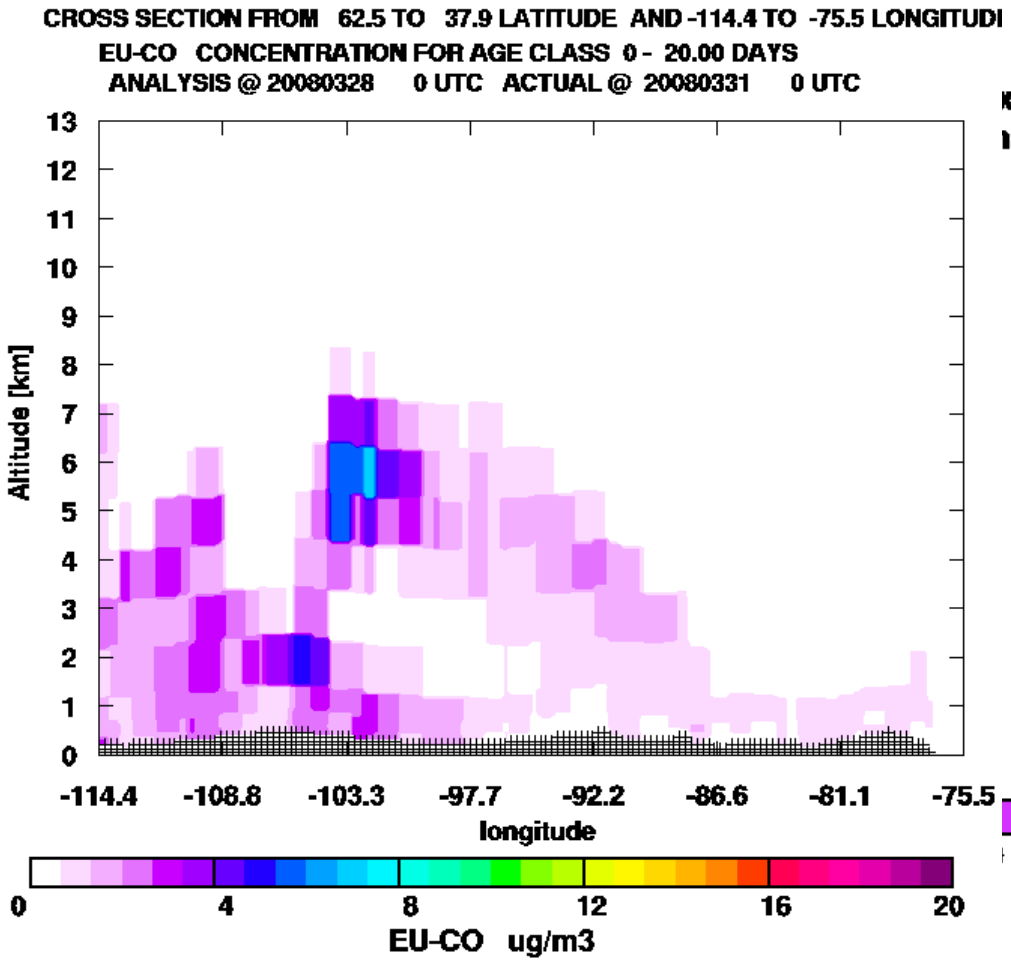
FLEXPART FC, 03 UTC 28 Mar, Asian plume

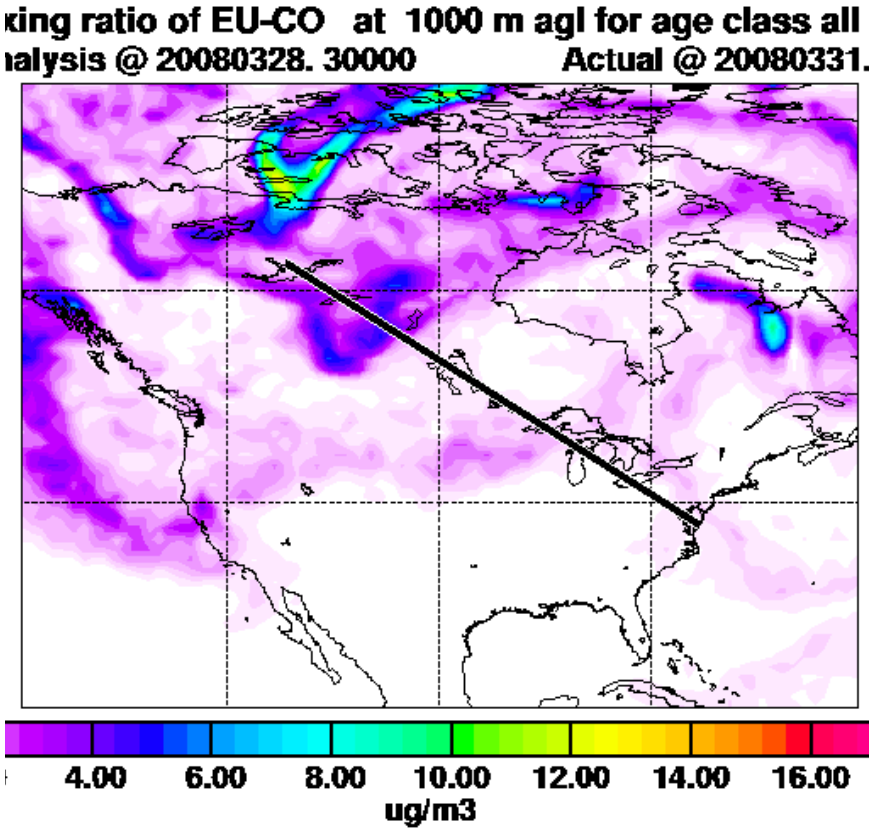




Elevated plume, vertically confined to about 1-2km thickness, altitudes range between 9 km (00UTC) to 4km (21 UTC), subsiding tendency. Plume maximum predicted around 40N, east of 85W. Low association with NO2. No SO4 and BC

FLEXPART FC, 03 UTC 28 Mar, European plume





Some dispersed tracer, low concentrations (4ug/m3) east of 100W at altitudes between 3-5 km, moving in SW direction. Plume associated with NO2. No SO4 and BC

University of Iowa

For Flight Planning meeting on
03-28-2008

ARCTAS

- Website located at

  http://www.cgrer.uiowa.edu/ARCTAS/arctas-2k8.html

- Google Earth KML files at:

  http://www.cgrer.uiowa.edu/ARCTAS/KMLfiles/ARCTAS_link.kml

ARCTAS 60km Tracer Forecast - Mozilla Firefox

File Edit View History Bookmarks Yahoo! Tools Help

http://www.cgrer.uiowa.edu/ARCTAS/249x249-current/pmenu.html

Customize Links

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ARCTAS | ARCTAS 60km Tracer Forecast

BACK

ARCTAS 60km Tracer Forecast, 00h = 0UTC, 03/27/2008

Please select layer

The 5.5km Layer, START

0 and END time step -

0 + to see

Source-Tagged Tracers & Meteorology

RH | Precipitation Rate

PBL Height | Anthrop CO

Biomass CO | N America BB CO

NAsia and Europe BB CO

SAsia and Africa BB CO | Alaska CO

Canada CO | USA CO

Greenland CO | Europe CO

Russia CO | China CO

Other Asia CO | BC | OC | Sulfate

DUST | Anthropogenic Hg

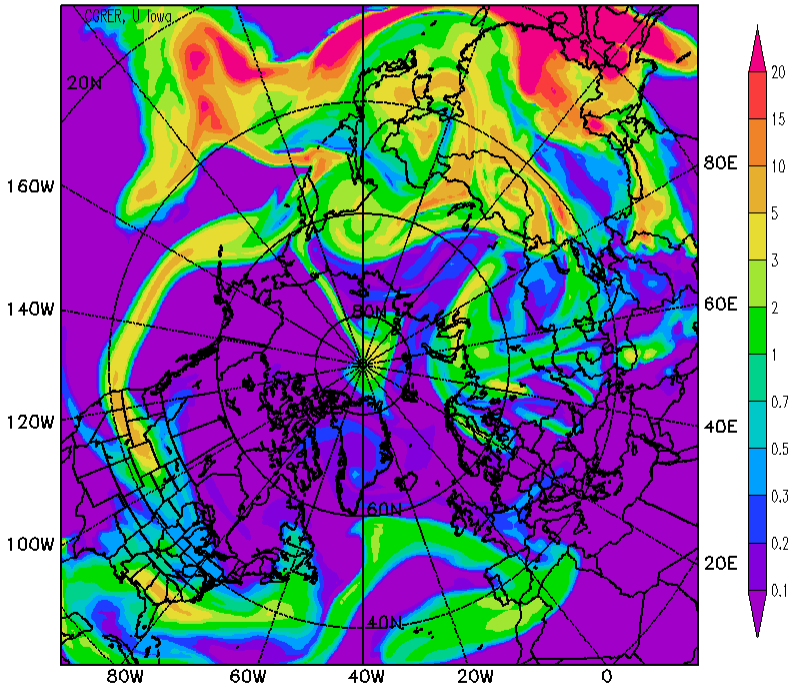
LPS SO2 | Volcano SO2 | NOx Age

VOC Age | Total AOD | BC AOD

OC AOD | Sulfate AOD

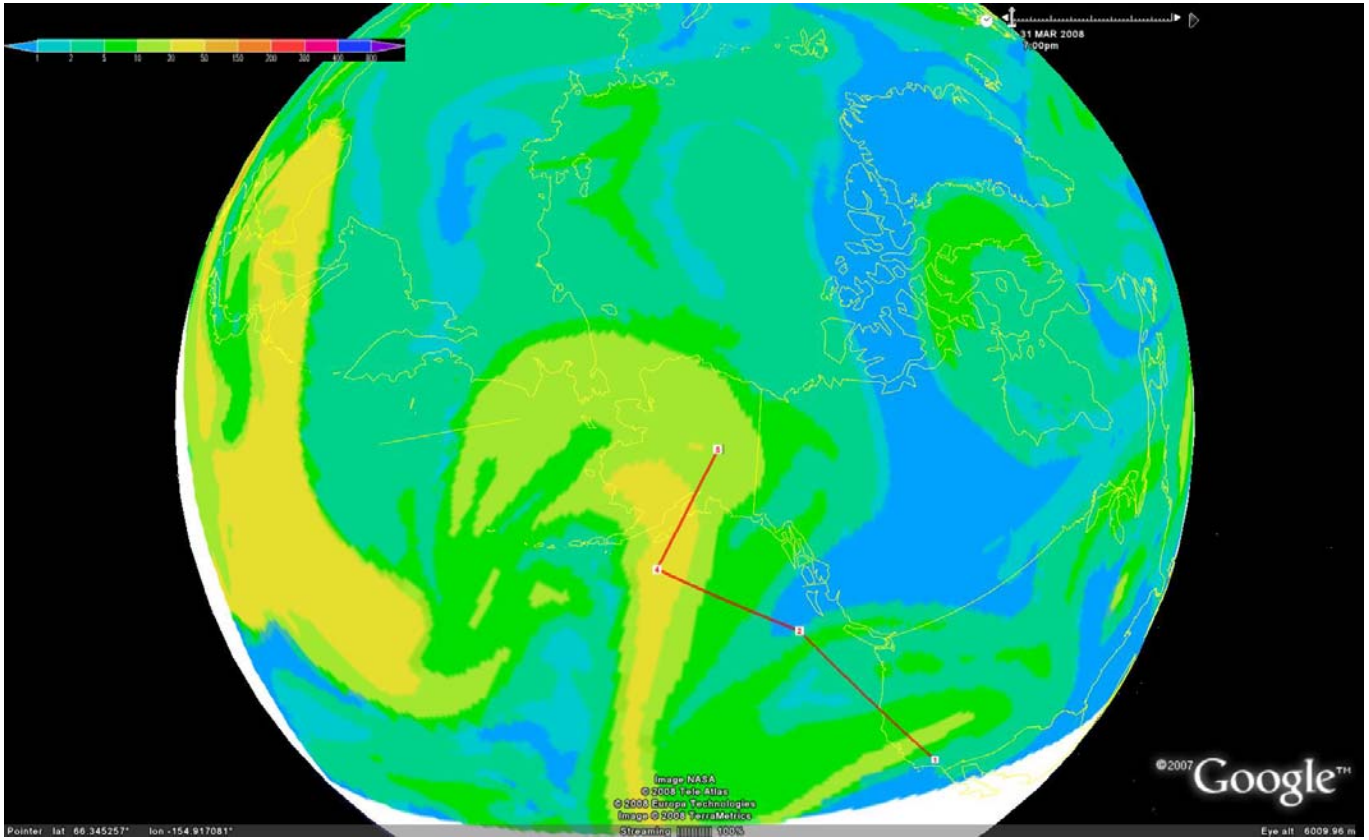
DUST AOD

Simulated BB_CO (ppbv) in the 5.5km layer at 0UTC, 03/27/2008

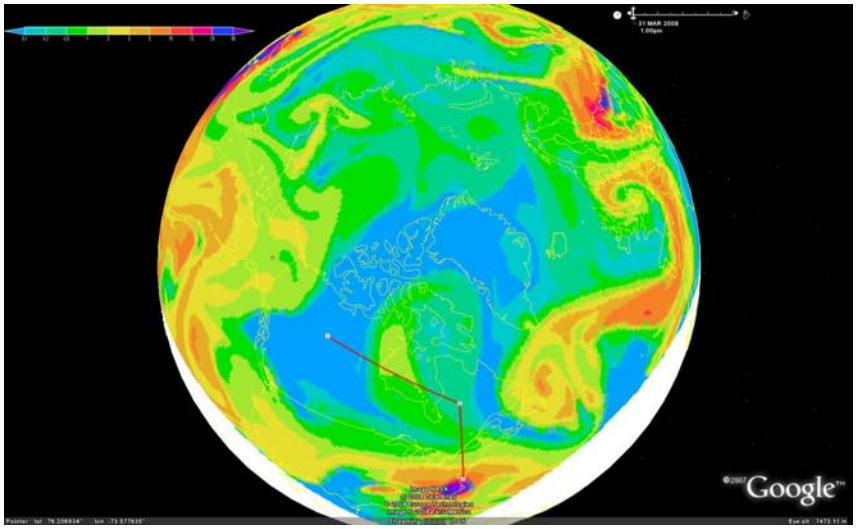


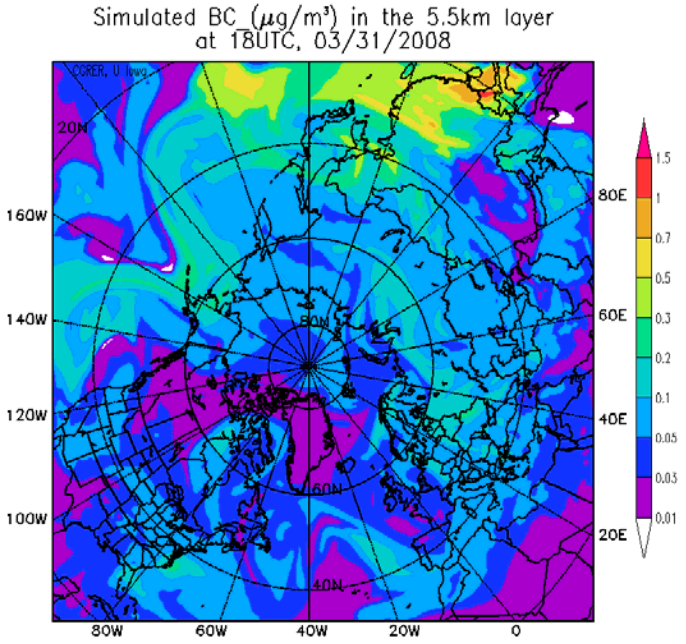
Point Plot Time-series Figure at a point

Done



- Take off: we expect to see aged Asian air masses with contribution from anthropogenic and biomass burning.
- From leg 1-2 going to even older air mass.
- Leg 2 to 3 fly through the strong gradient of Asian pollution outflow.
- Leg 3-4, as we move north we should see a strong latitudinal gradient of pollution sources from South Asia, China, Russia and Europe (North of Fairbanks)





Leg 1: We expect to see some high US CO and some South Asia pollution
At higher altitude.
Leg 2: Fly through the pollution outflow from USA

Chemical forecast system of boundary layer ozone and pseudo-BrO_x at Gerogia Tech

Tao Zeng, Yuhang Wang, Sunny Choi,
Thomas Kurosu, and Kelly Chance

March 28, 2008

The forecast system

3 modules:

1) Polar version of MM5 driven by NOAA NCEP GFS meteorological data
2) Process OMI and GOME-2 satellite BrO data to calculate from the total vertical column (http://www.cfa.harvard.edu/atmosphere/CampaignSupport/ARCTAS/Spring2008/) to tropospheric vertical column
3) REAM model simulations driven by satellite BrO observations

Timetable:

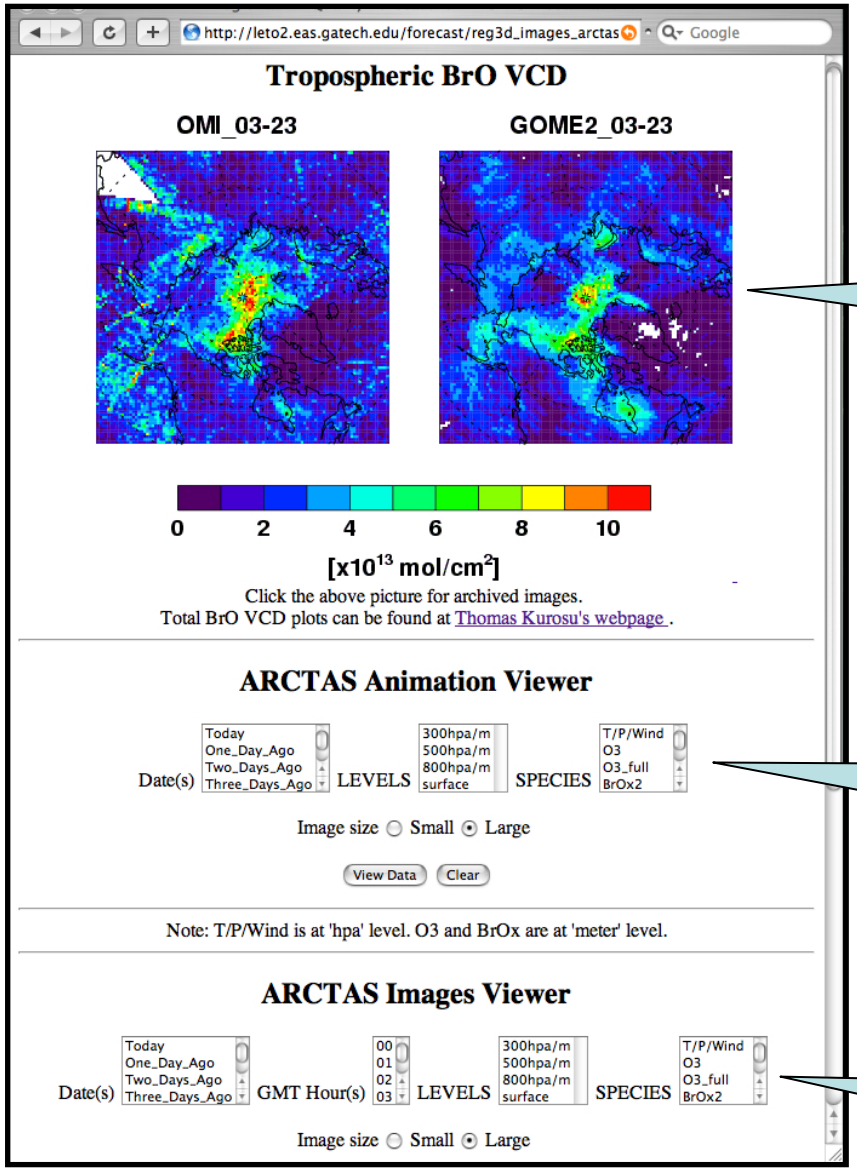
- Midnight - daily satellite BrO data
- 2 am ET - polar MM5 + REAM
- 4:30 am ET - Forecast products are ready

GA Tech Forecast Weblink

http://leto2.eas.gatech.edu/forecast/arctas.html

Three products are provided.

1. Processed tropospheric column BrO from OMI and GOME2.
2. 48-hour meteorological forecast of T/P/Wind using the polar version of MM5 (output at surface, 800, 500, and 300 hPa).
3. 48-hour forecasts of boundary layer ozone and pseudo BrOx tracers (output at surface, 300, 500, and 800 m).
   - BrOx2 is a pseudo BrOx tracer with daytime chemical lifetime of 1 day.
   - BrOx5 is a pseudo BrOx tracer with daytime chemical lifetime of 3 days.

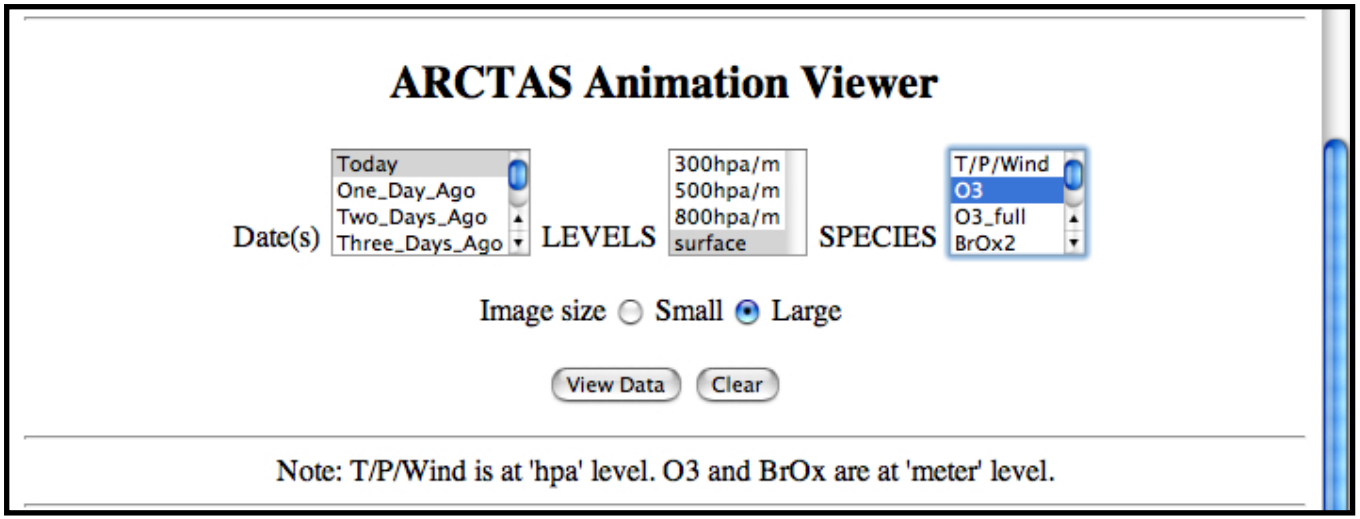


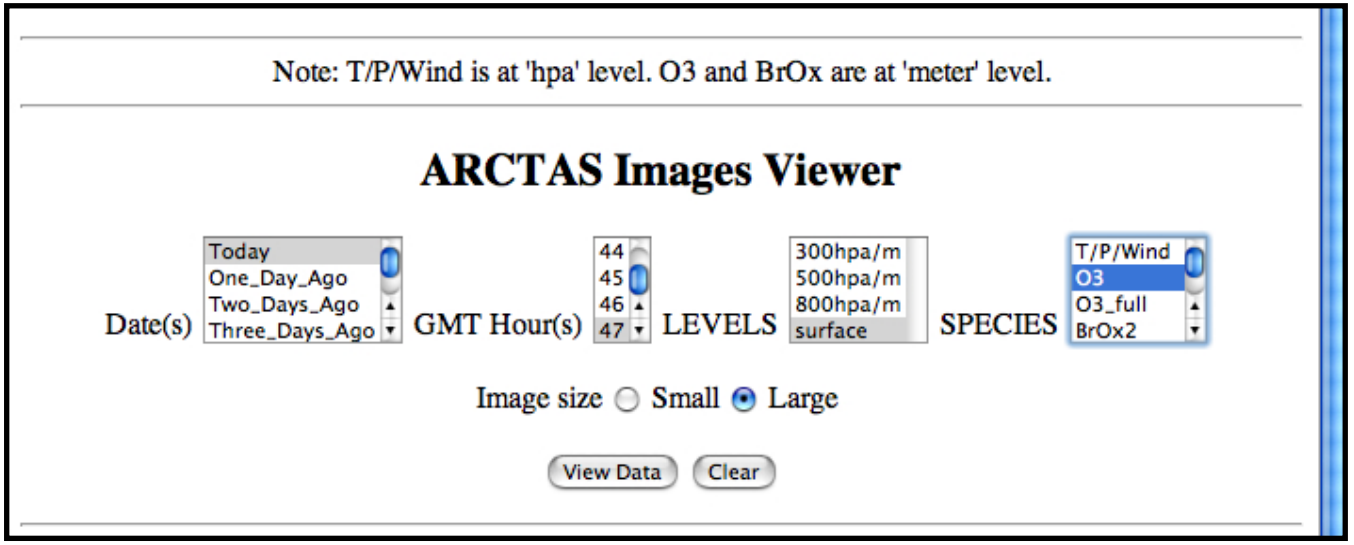
Tropospheric BrO VCD from OMI & GOME-2

Animation viewer for 2-day met and O3/ BrOx2/BrOx5 forecast

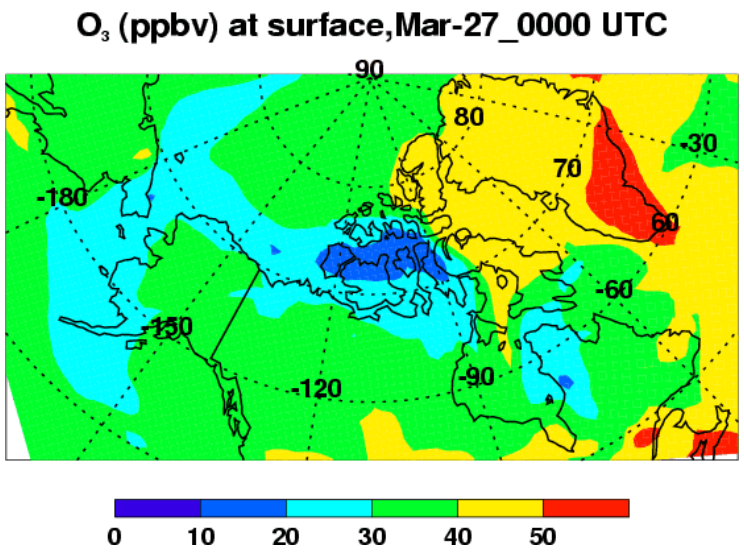
Images viewer for 2-day met and O3/ BrOx2/BrOx5 forecast

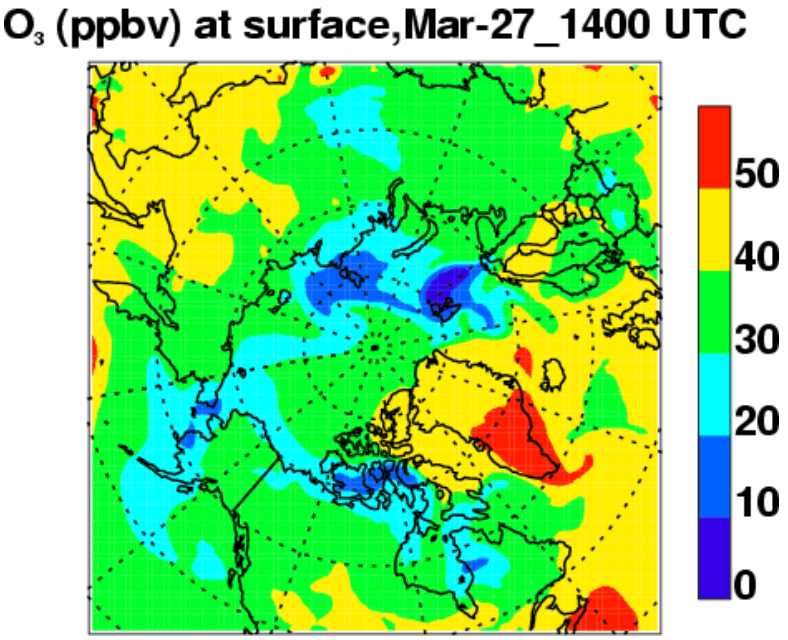
- Multiple selections by CTRL-click
- *_full is the result for full domain
- T/P/Wind on hPa levels; chemicals on meter levels





Both 2-day animations and hourly images are available

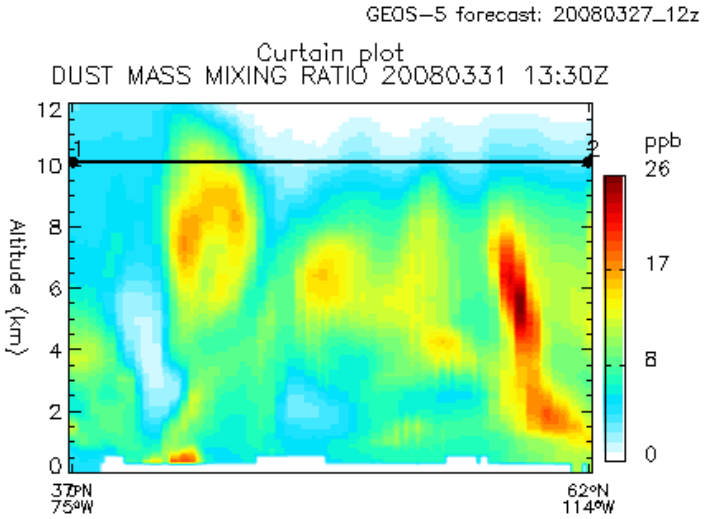


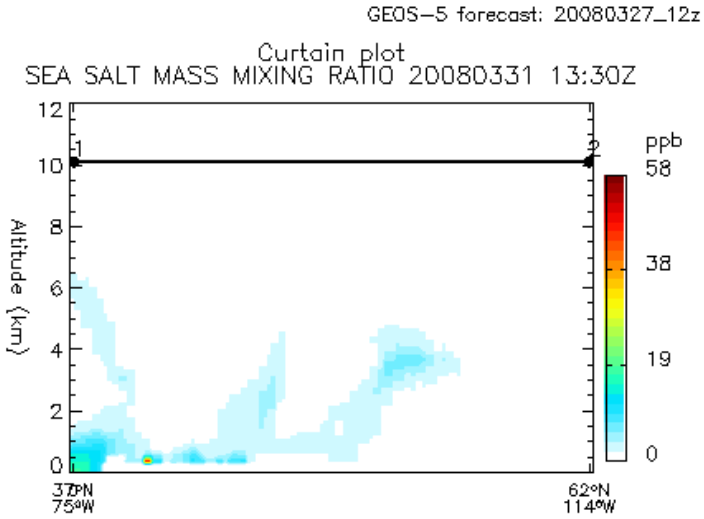


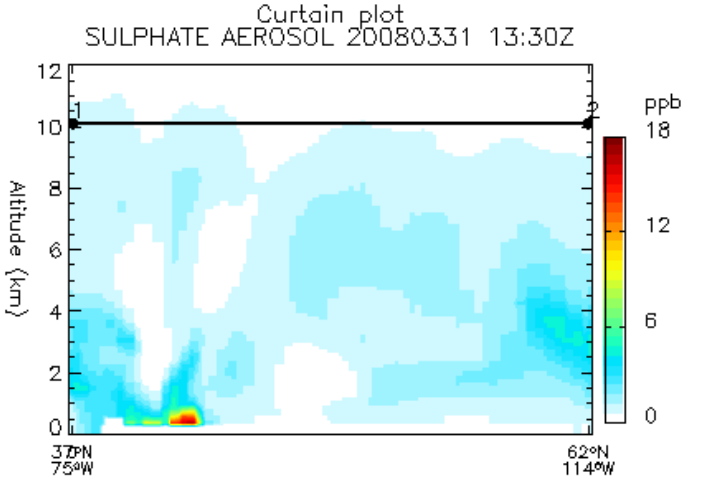
March 31, 13:30Z Forecast

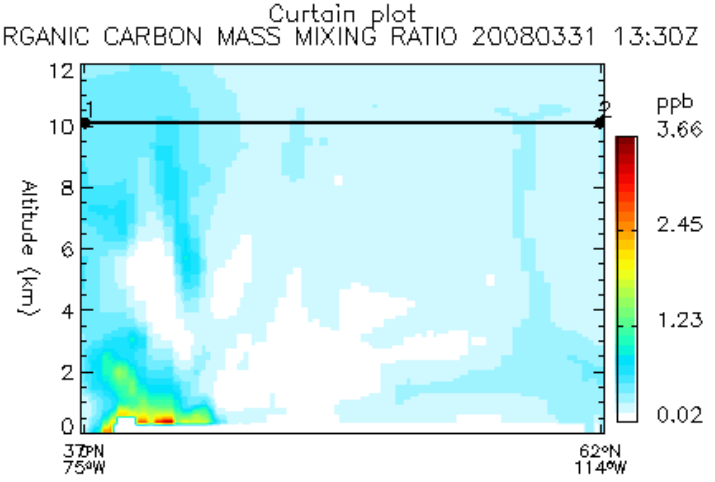
Aerosol Curtain Plots

P-3 Transit: Wallops to Yellowknife









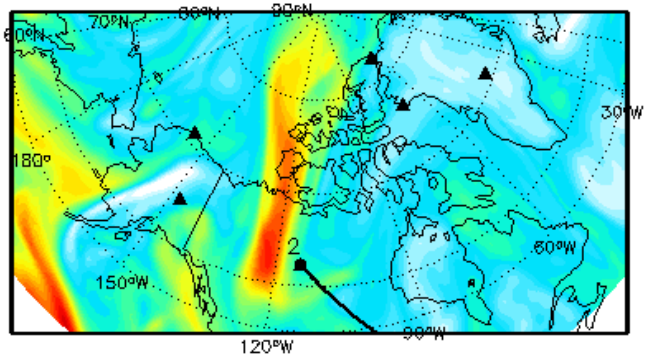
March 31, 13:30Z Forecast

Aerosol Optical Thickness Plots

P-3 Transit: Wallops to Yellowknife

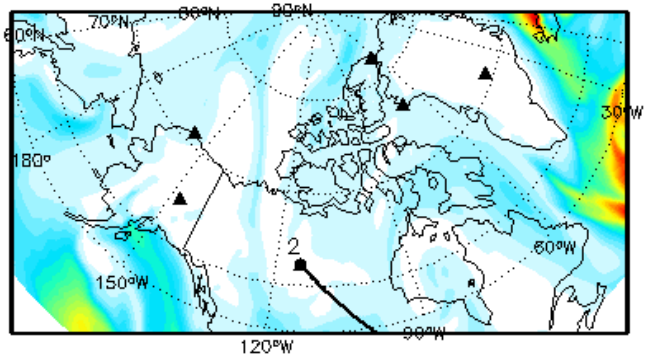
GEOS–5 forecast: 20080327_12z

DUST EXTINCTION AOT [550 NM]
20080331 13:30Z

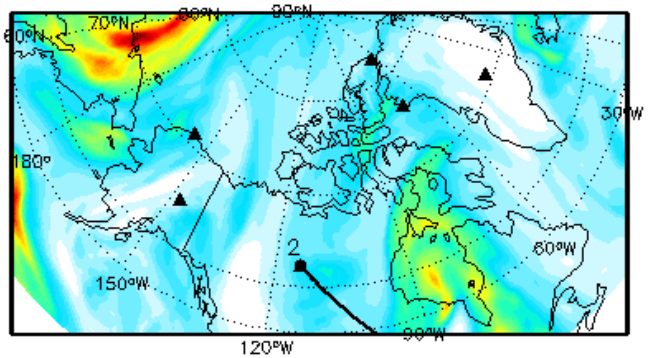


GEOS–5 forecast: 20080327_12z

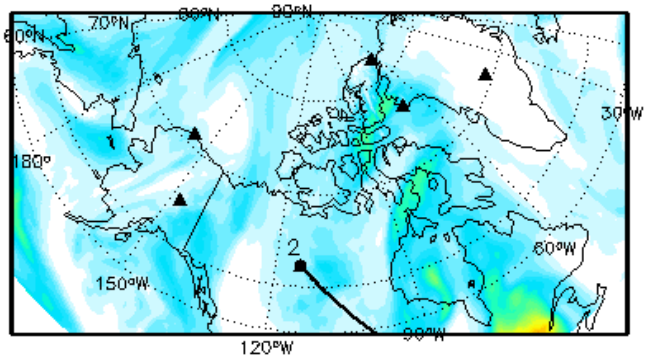
SEA SALT EXTINCTION AOT [550 NM]
20080331 13:30Z



SO4 EXTINCTION AOT [550 NM]
20080331 13:30Z



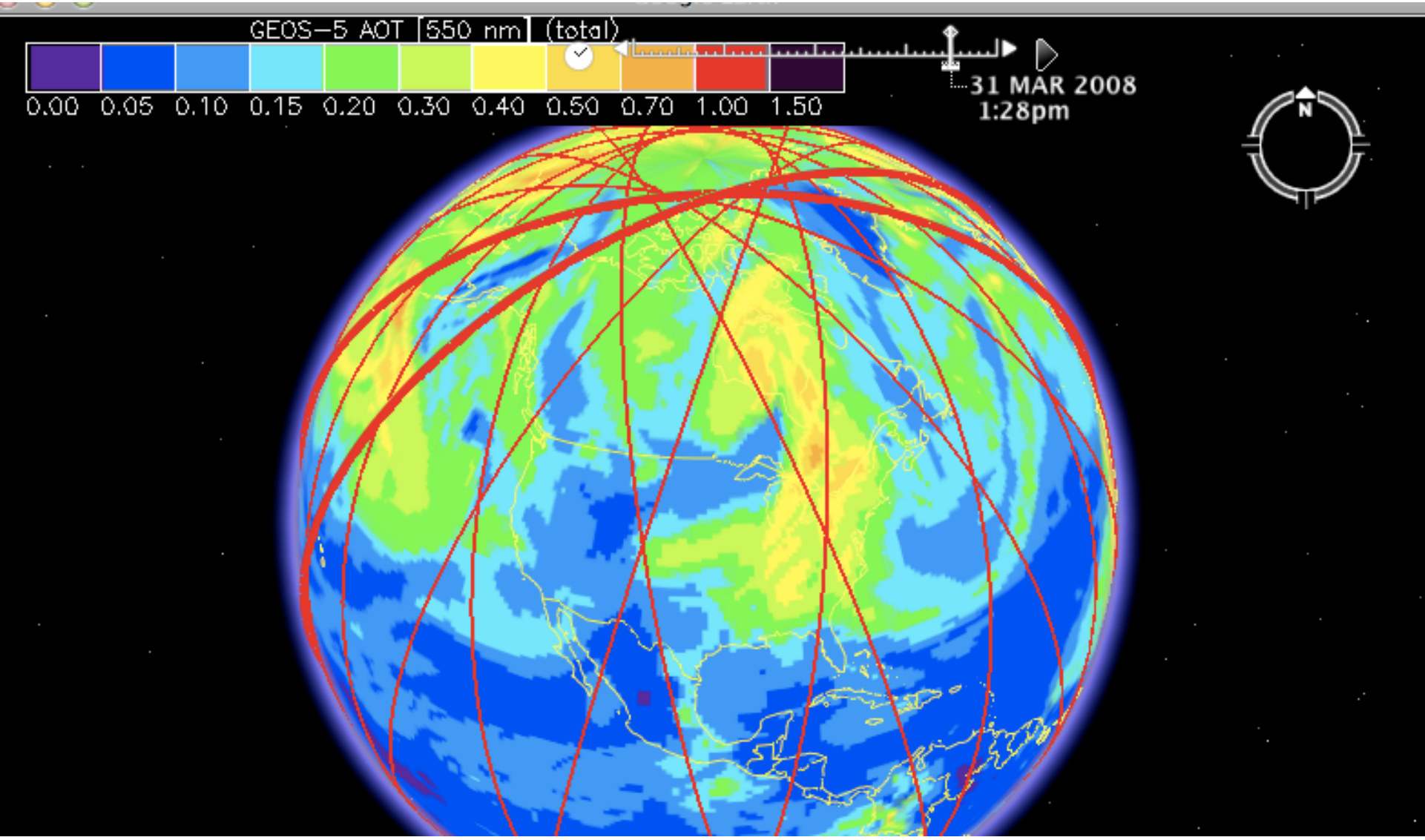
ORGANIC CARBON EXTINCTION AOT [550 NM]
20080331 13:30Z



March 31, 13:30Z Forecast

Aerosol Optical Thickness Plots

P-3 Transit: Wallops to Yellowknife



NCAR Forecasts

MOPITT CO – Near-Real-Time Retrievals

MOZART-4/GFS

4-day forecasts - Full chemistry (2.8°); tracers (0.7°)

CAM-Chem/DART

Assimilation of MOPITT CO, MODIS AOD, met – 6-day forecasts – Full chemistry (1.9°x2.5°), tracers (1°x1.2°)

Louisa Emmons

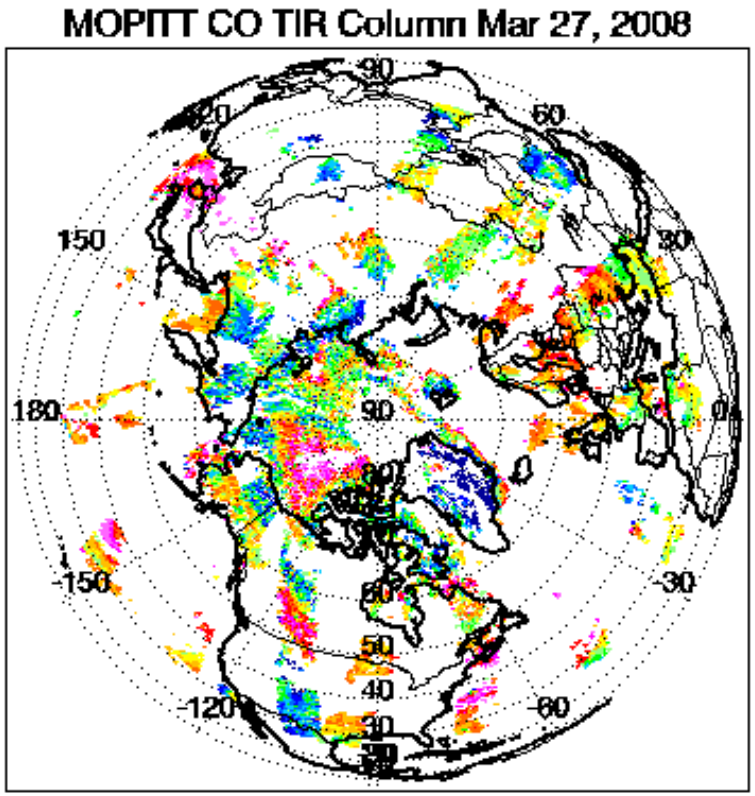
Ave Arellano, Gabi Pfister

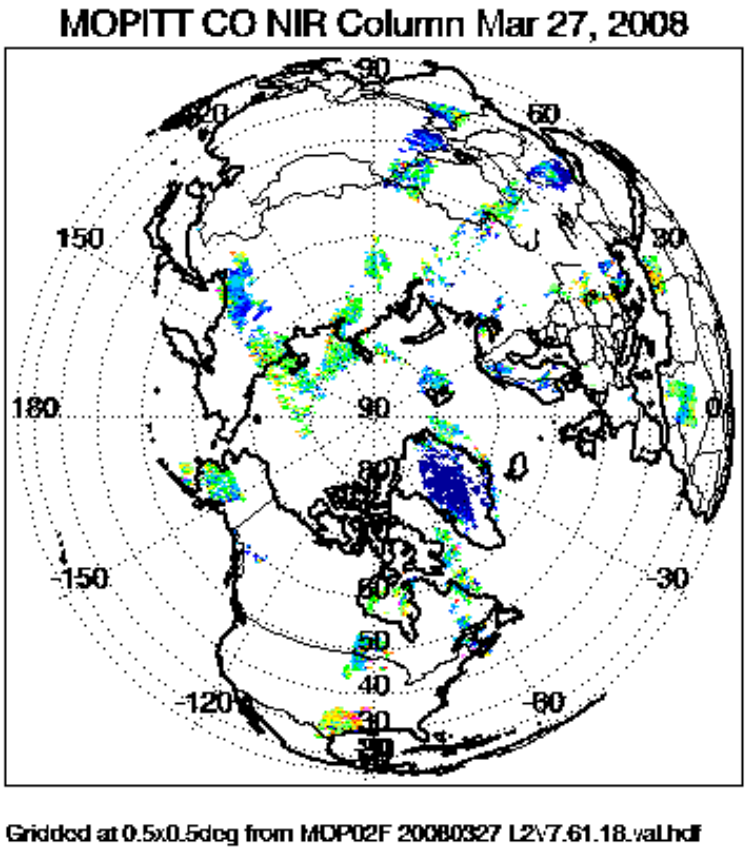
Merritt Deeter, Dallas Masters, Debbie Mao

David Edwards, Helen Worden

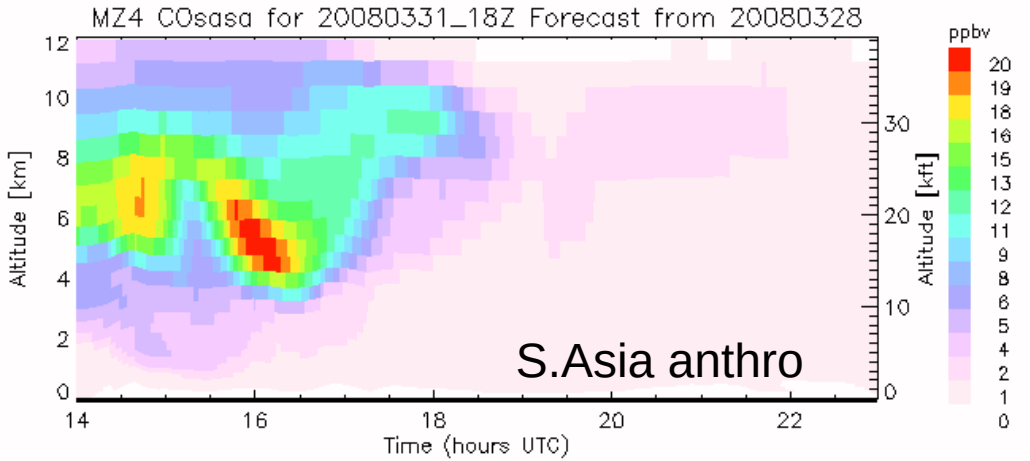
Jean-Francois Lamarque, Gwendoline Lacressoniere

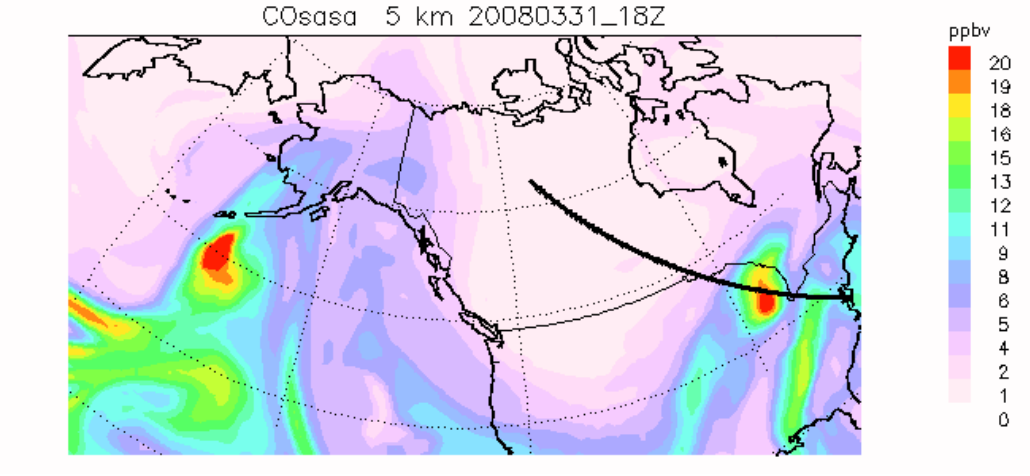
MOPITT CO – Retrievals from Thermal Channels (TIR) and Solar Channels (NIR)

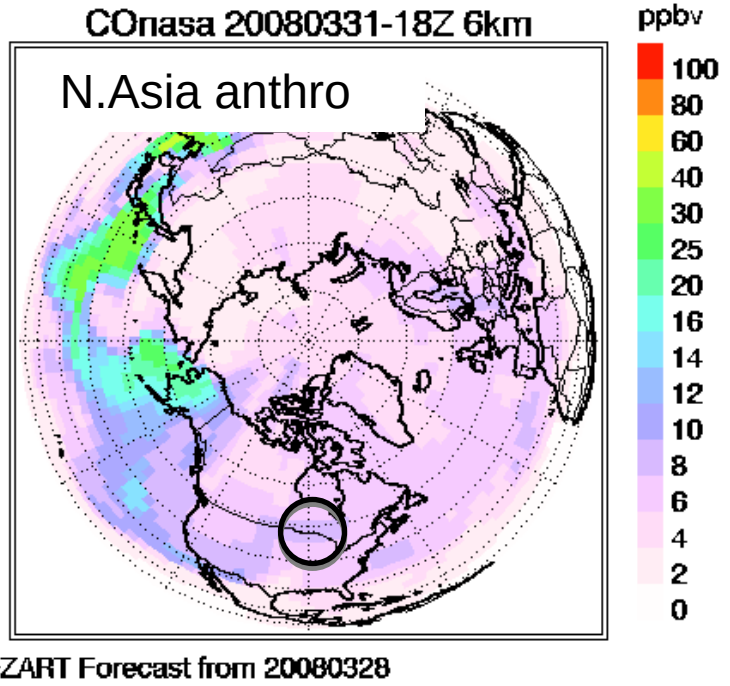


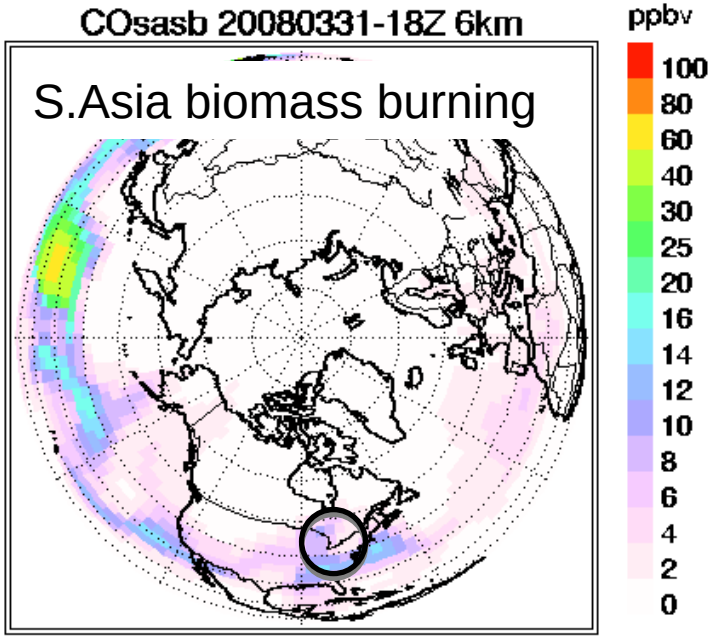


Mar 31 Wallops to Yellowknife – MOZART-4/GFS









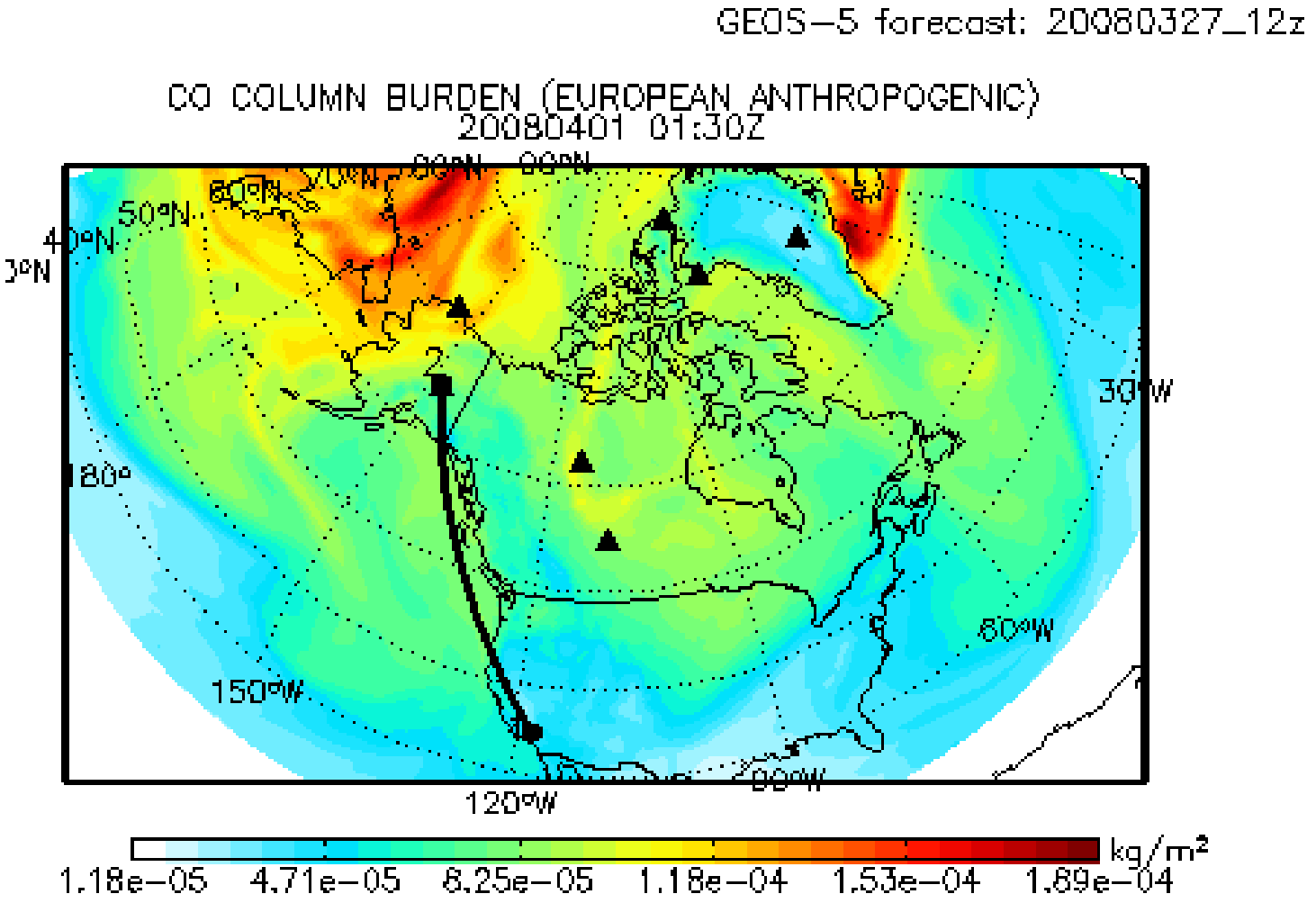
Asian pollution (anthro and fires) at 5-8 km between VA and Great Lakes

April 1

- Model forecasts not available yet
- DC8 Palmdale – Fairbanks:
  - Suggest 5 min leg in marine boundary layer

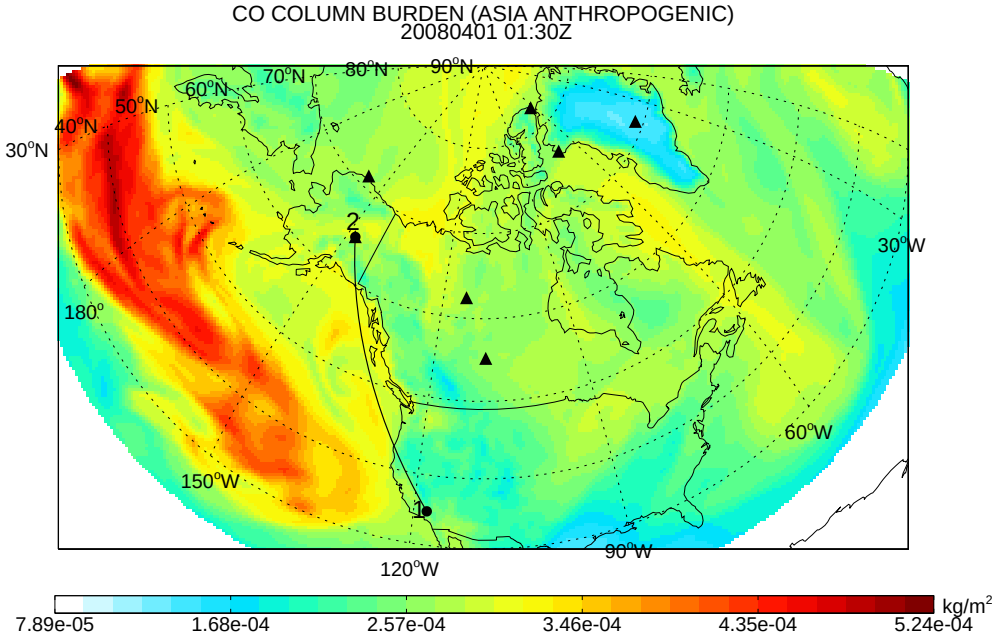
European CO

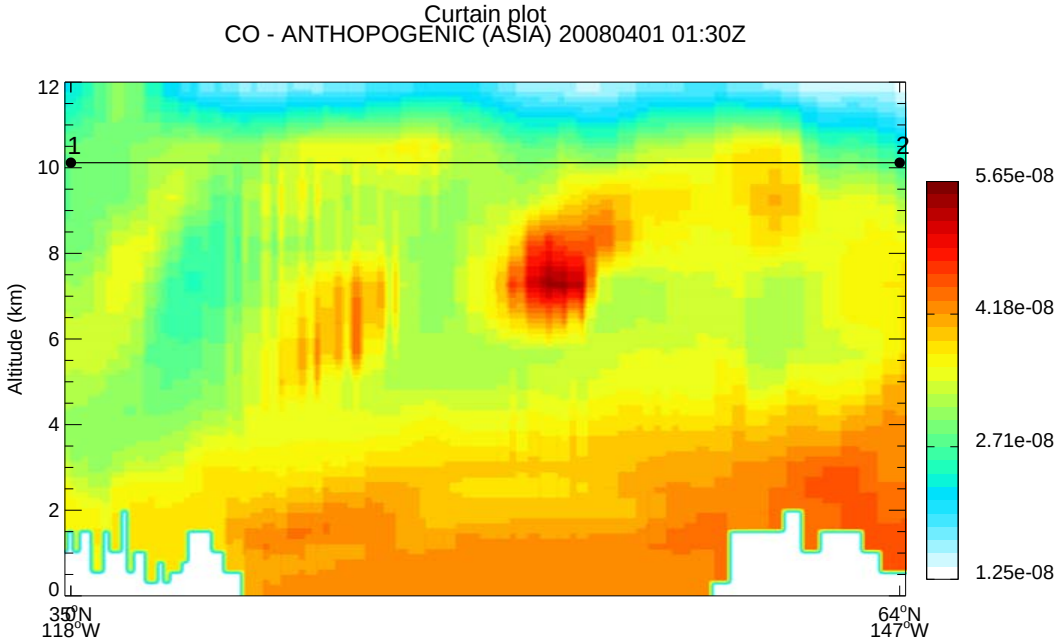
Column



Asian CO

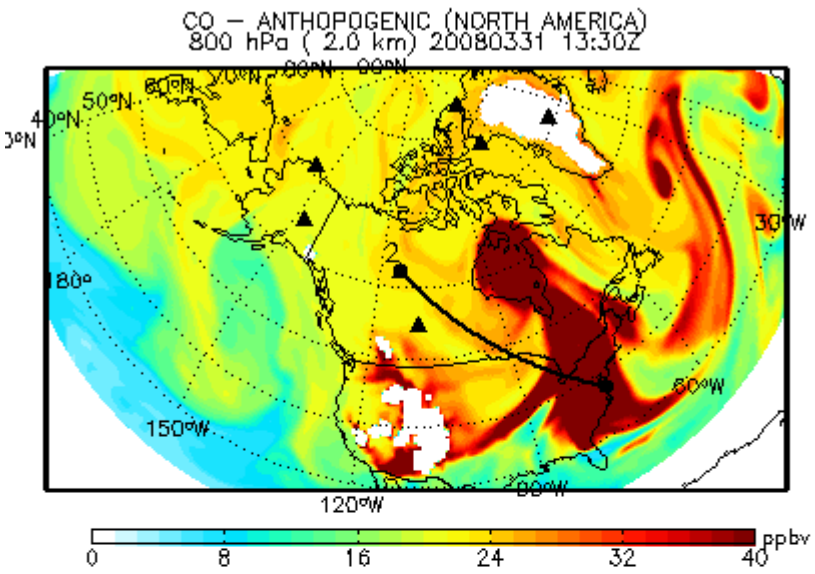
GEOS-5 forecast: 20080327_12z





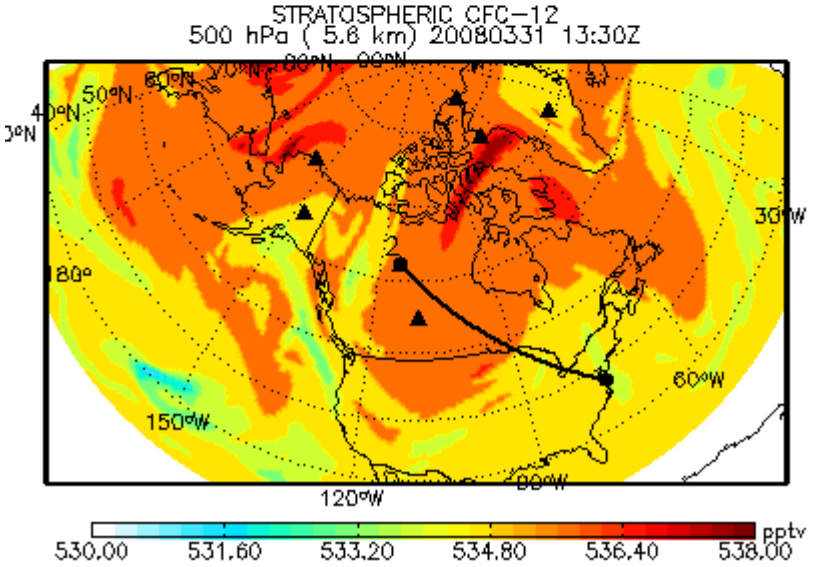
N. American CO

800 mb

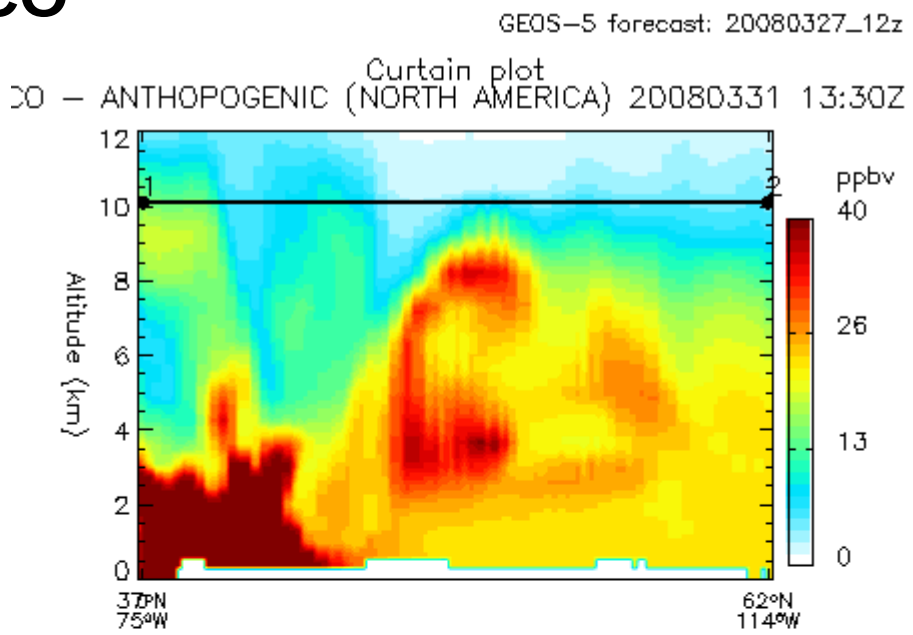


Stratospheric CFC-12

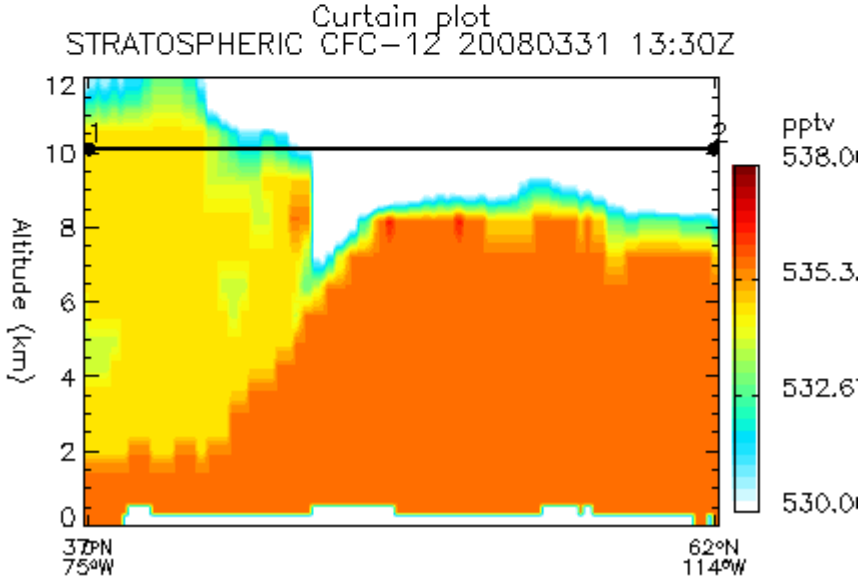
500 mb



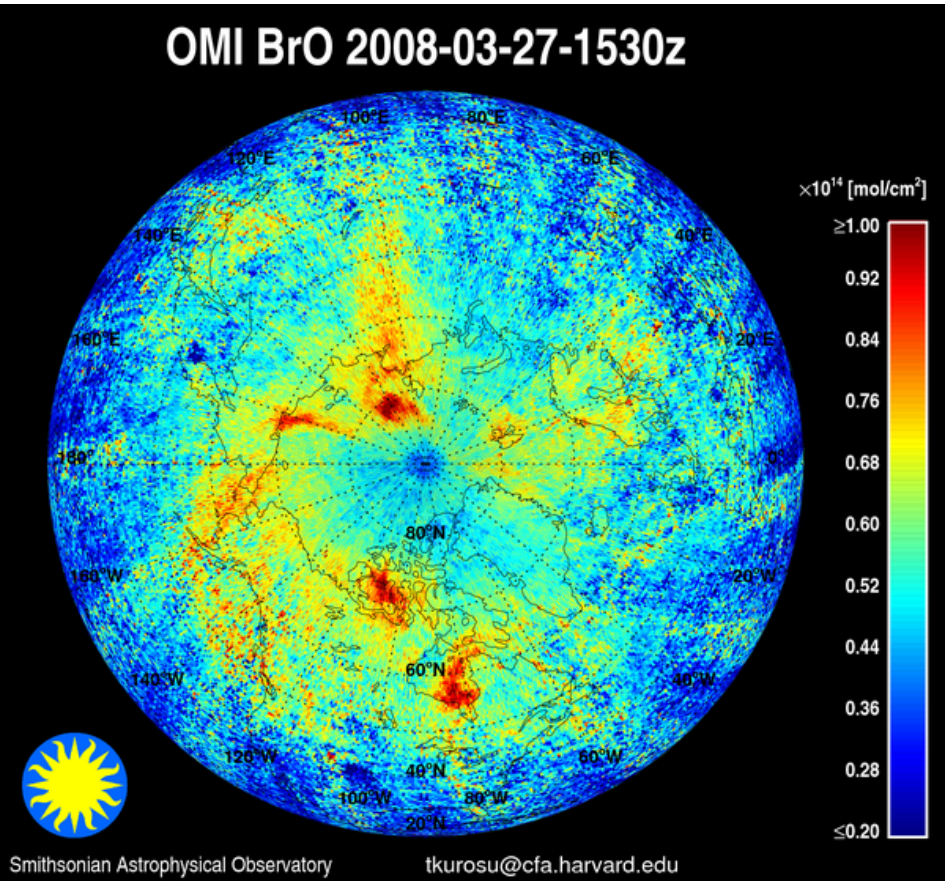
N. American CO

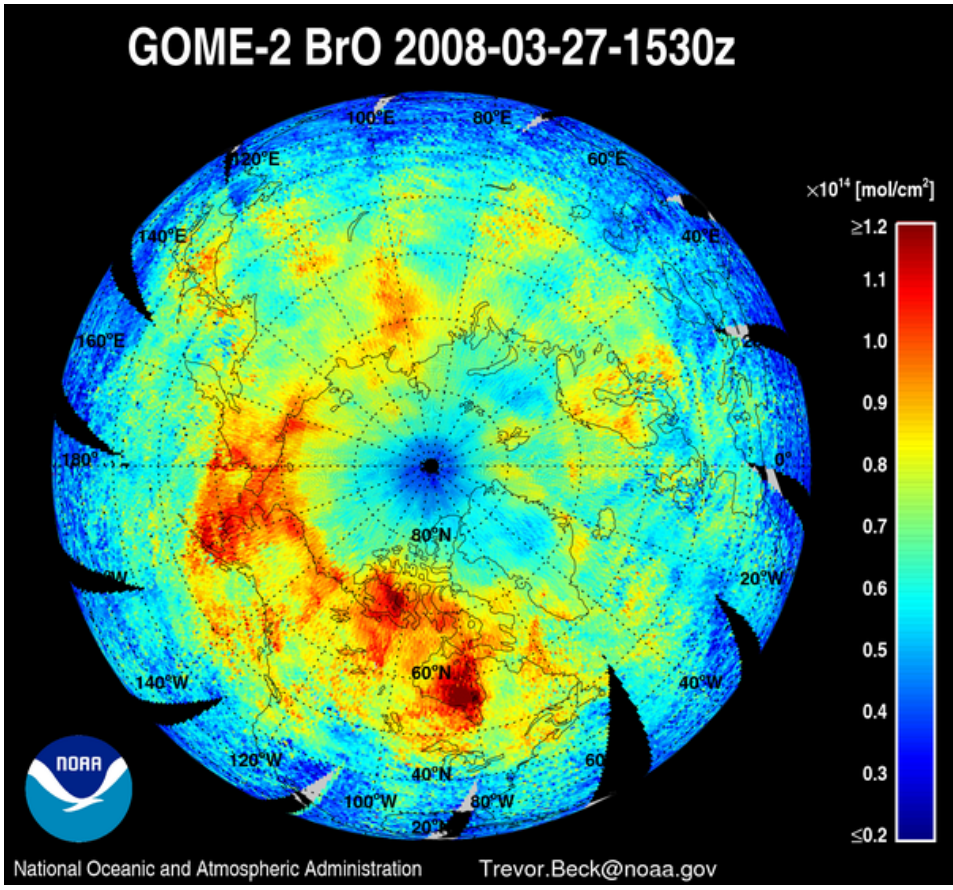


Stratospheric CFC-12

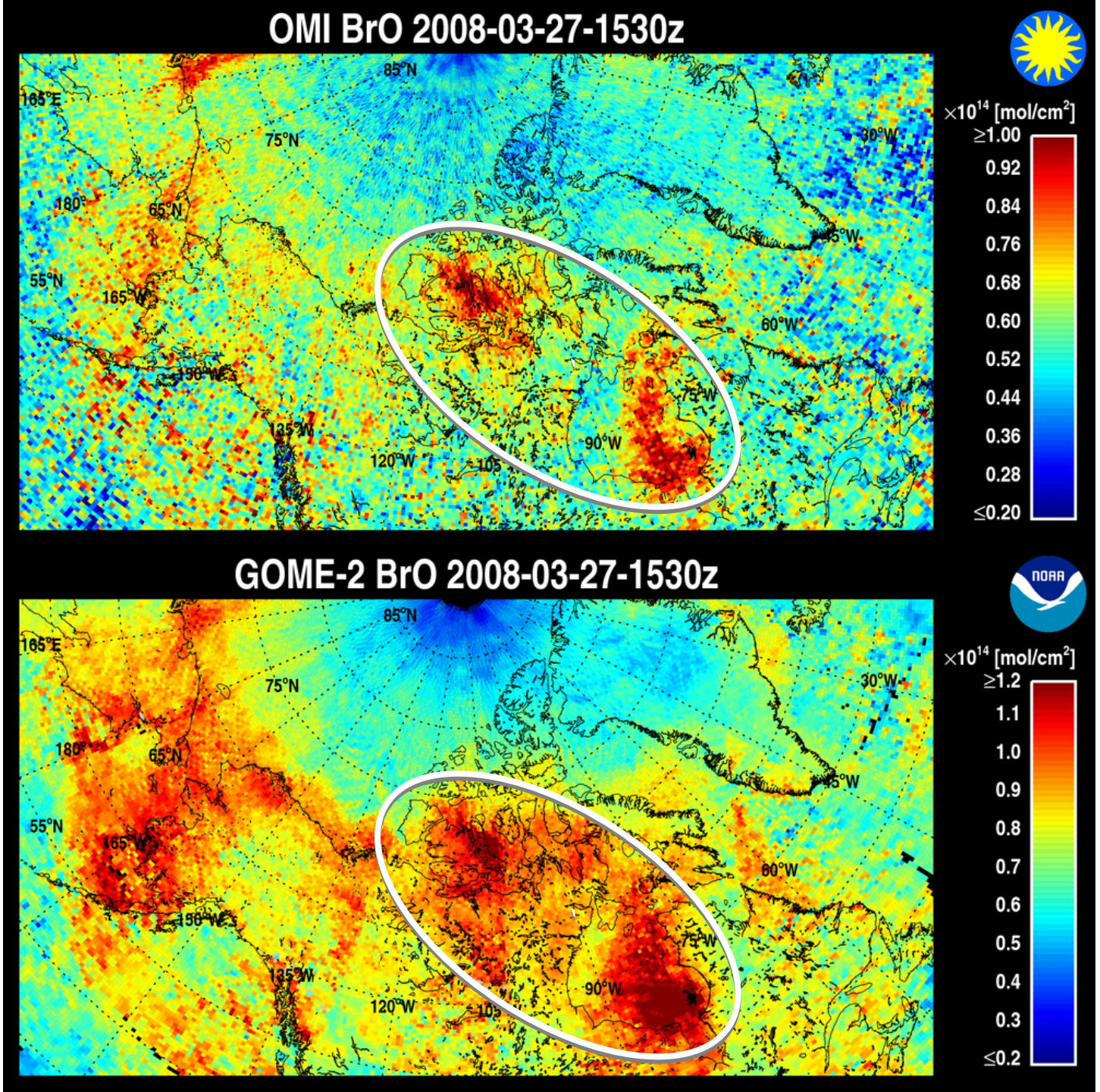


BrO explosions have occurred during March 2008





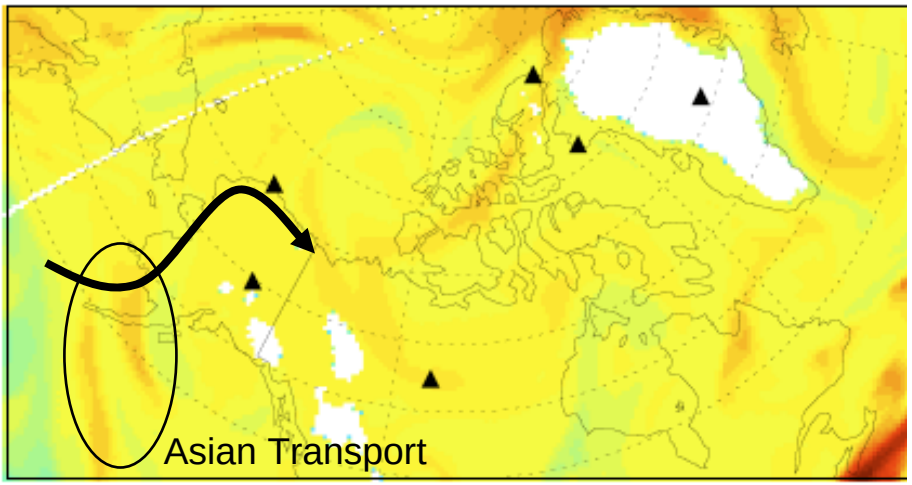
Locations:
Queen Elizabeth Islands, Hudson Bay, Bering Straight?
Duration: 3-8 days

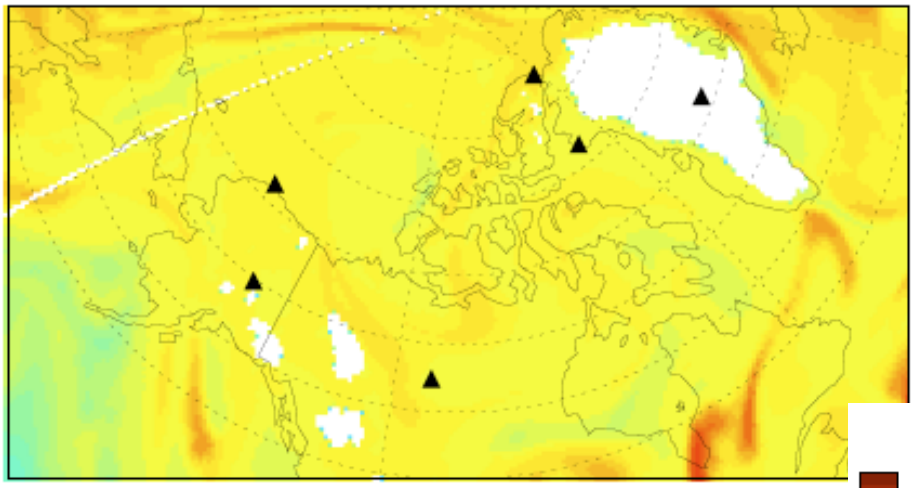


OMI and GOME2 both show residual of large BrO outbreaks on 3/13-3/18

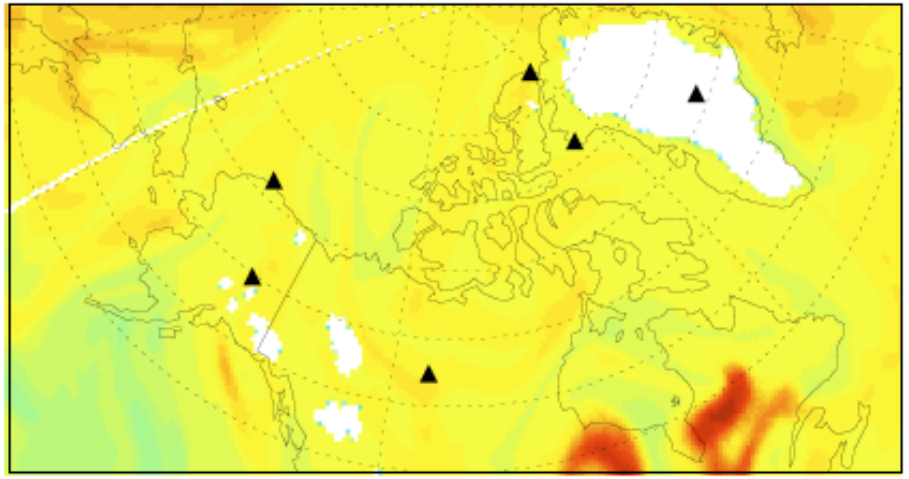
BrO persists in atmospheric low

3/28 Total CO 850 hPa 3/29

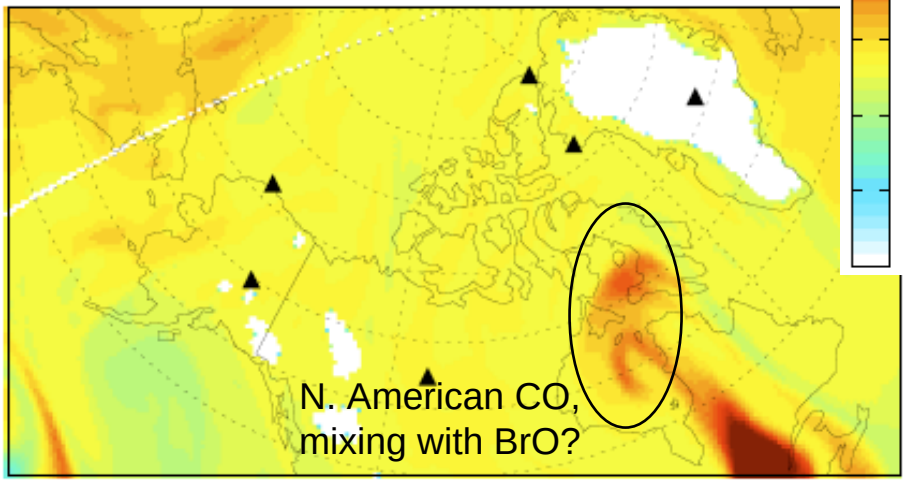


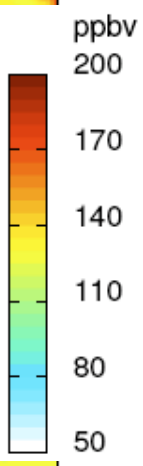


3/30

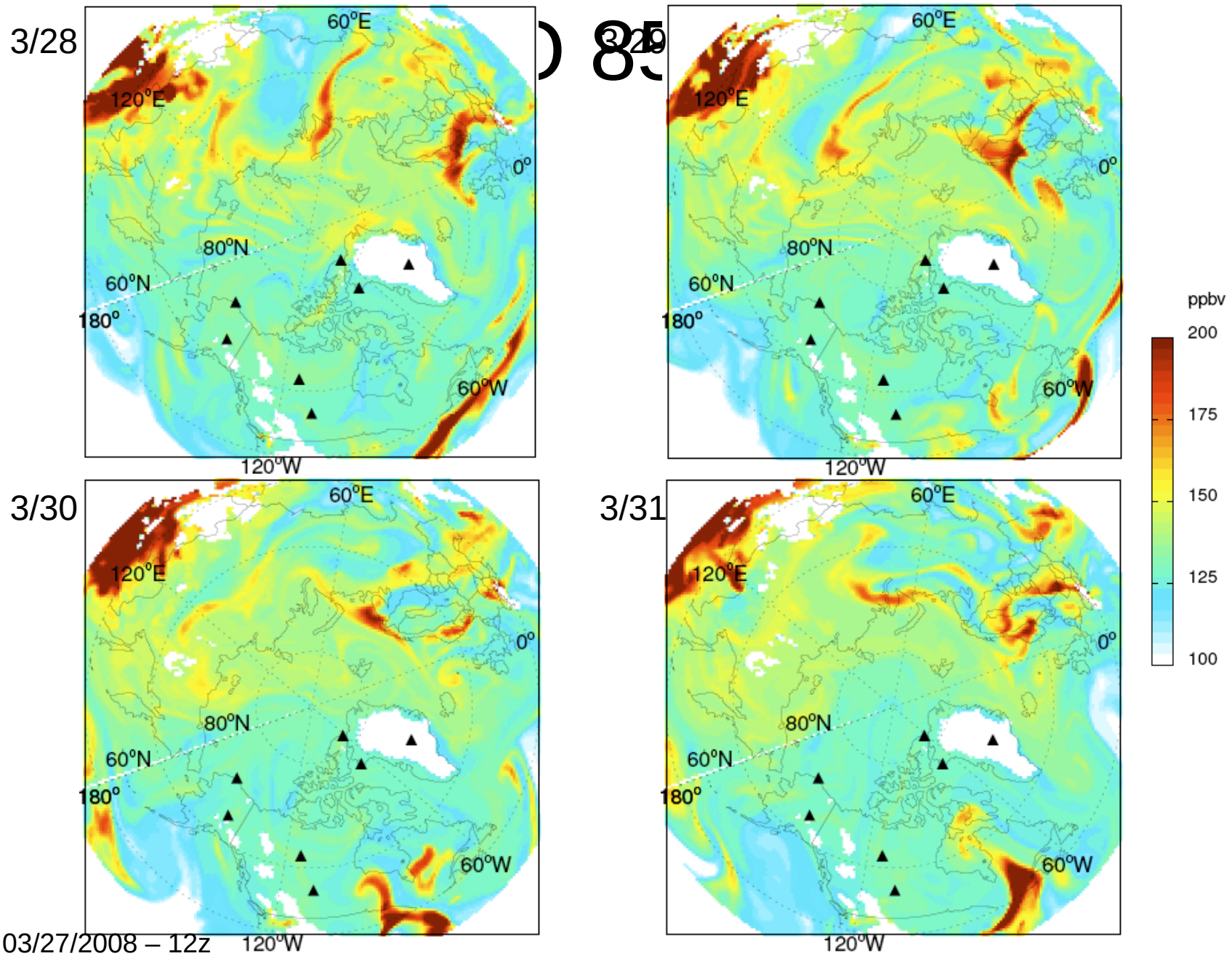


3/31





Initialized 03/27/2008 – 12z



Initialized 03/27/2008 – 12z

P-3 Flight Opportunity 3/31